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WINTRINGHAM, C.

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THE

WORKS

Of the late

CLIFTON WINTRINGHAM,

PHYSICIAN at YORK,

Now firſt Collected and Publiſhed entire:

With large

ADDITIONS and EMENDATIONS

From the

Original MANUSCRIPTS.

L. 4

MEDICAL SOCIETY OF LONDON·

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By his SON
C. *WINTRINGHAM*, M. D. F. R. S.

Physician to His Royal Highness the Duke
of Cumberland, and during the late War
Abroad, Physician to His Majesty's Hospitals on the Military Establishment.

In TWO VOLUMES.

VOL. I.

Mortuus Ipſe licèt, ſuadebit gnaviter id quod
Æque Pauperibus prodeſt, Locupletibus Æque,
Æque neglectum Pueris, Senibuſque Nocebit.

LONDON:
Printed by G. Woodfall, at the *King's-Arms*,
Charing-Croſs.

M. DCC. LII.

A

TREATISE

OF

ENDEMIC DISEASES.

A
TREATISE
OF
ENDEMIC DISEASES,

EXPLAINING

The Different Nature and
Properties of *Airs*, *Situations*, *Soils*, *Waters*, *Diet*,
&c.

Nec Tellus eadem parit omnia, Vitibus illa
Convenit, hæc Oleis, hic bene Farra virent:
Hinc quoniam variant Animi, variabimus Artes
Mille mali Species, mille Salutis erunt.

OVID.

Firſt publiſhed in 1718.

THE

PREFACE.

THAT the Natural Conſtitutions, as well as Diſeaſes of Men, inhabiting different Countries and Climates, and even different Parts of the ſame, are extreamly various, has been long ſince obſerv'd (a); *but the Cauſes and ſecret Springs of theſe Alterations in the Animal Oeconomy, by the Knowledge of which, we may be beſt directed either in preventing, or remedying the*

(a) *Hippoc.* de Aerib. Aq. & Loc. 1. 5. LVII. 1. Orat. Theſſal. 1. 130.

Galen. de Sanitate Tuend. lib. ii. cap. 7. & lib. v. cap. 14.

the Miſchiefs conſequent on them little regarded. Hence it frequently happens, that in Caſes and Circumſtances otherwiſe parallel, the Succeſs does not equally anſwer the Expectation of the Phyſician: For, the firſt and more remote Cauſes of Diſeaſes, whether Acute or Chronic, as well as Difference of Conſtitutions, depending in a great Meaſure on the various Diſpoſition of the Air, Situation, Manner of Living, and the like, as will appear by the following Pages, and theſe being often neglected, becauſe of other ſeemingly more immediate Cauſes, muſt render the Cure much more difficult, if not altogether impracticable; the ſame Cauſe which from a ſound and healthful State gave Riſe to a Diſtemper, being generally, when continued, able to ſupport it againſt the moſt potent Medicine,

cine, and otherwiſe ſucceſsful Method of Cure.

This is ſufficiently evident even in our own Country, from thoſe Agues which ſo conſtantly infeſt the Hundreds *of* Eſſex, Fens *of* Cambridgeſhire, *and other flat and watery Countries; which in thoſe Airs, through the greater Viſcoſity induced into the Blood, as well as the Relaxation of the ſolid Parts by the Humidity of the Air, require ſtronger Diſſolvents, and a Method of Cure different either in the Quantity, or Quality of the Medicines from thoſe of other Places, whoſe Situations are different in this Reſpect; and yet all this in ſome Caſes and Conſtitutions, ſo long as they remain in theſe humid Airs, is often inſufficient, to prevent thoſe frequent Relapſes to which they are ſubject, which yet the Removal into* *one more clear and dry, tho' unaſſiſted, will often effectually prevent. Agreeable to this is the Doctrine of* Celſus, *who aſſures us that the ſame Diſeaſes in different Countries and Places, require different Methods of Cure on this very Account,* viz. Differre quoque pro Natura Locorum genera Medicinæ, & aliud opus eſſe *Romæ*, aliud in *Ægypto*, aliud in *Gallia* (b). *Of the ſame Mind is* Lucretius, *who has given us an elegant Deſcription of the different Natures and Qualities of various Regions,* viz.

Nonne vides etiam Cæli novitate & Aquarum
Tentari, procul a Patria quicunque domoque
Adveniunt? ideo quia longe diſcrepat Aer.

Nam

(b) *Celſ.* in Præf. ad Lib. i. p. 8.

Nam quid *Britannum* Cælum differre putamus,
Et quod in *Ægypto* eſt qua Mundi claudicat Axis,
Quidve quod in *Ponto* eſt differre a *Gadibus* atque
Uſque ad nigra virûm percoctaque ſæcla calore?

And again,

Eſt Elephas Morbus qui propter Flumina Nili
Gignitur *Ægypto* in media neque præterea uſquam.
Atthide tentantur greſſus, Oculique in Achæis
Finibus, inde aliis alius locus eſt inimicus
Partibus & Membris: varius concinnat id Aer (c).

(c) *Titi Lucret.* Lib. vi. verſe 1101.

Nor is this Difference in the Nature of Diſeaſes of various Places, leſs evident from the Practice of Phyſick in Uſe amongſt moſt Nations in the ſame Diſeaſes, which their frequent Experience recommends as moſt uſeful and convenient. Whence it is that the Engliſh, French, Spaniards, Germans, &c. *differ in their Practice, each recommending that, which they have found moſt uſeful to thoſe of their own Country. And indeed without ſome Regard had, to the different Cauſes and Riſe of Diſeaſes in particular Places and Countries, ariſing either from the Climate, Air, Soil, Situation, Waters, Diet, or the like; it cannot otherwiſe happen, but we muſt be frequently miſtaken in our Prognoſticks, and fail of that Succeſs we might otherwiſe reaſonably expect.*

'Twas this Contemplation of the ſecret and unobſerved Cauſes of Diſeaſes, by which the Great Empedocles *check'd the Growth of the Plague at* Agrigentum, *viz. By ſtopping the Mouths of ſome neighbouring Mountains, whoſe pernicious Fumes had infected the adjacent Country* (e). *Nor was that leſs remarkable, which he did at* Selinis, *where, by a freſh Current of Water, drawn from two Rivers in the neighbouring Country* (f), *he check'd the raging of the Plague, in thus cleanſing its ſtagnating Ditches of their Filth, whoſe putrid Exhalations had infected the Air, to a Degree altogether peſtilential. To which may be added the Cure of the Plague at* Athens *by* Hippocrates, *by the Help*

(e) *Plutarchi* Lib. περὶ πολυπραγμοσύνης.

(f) *Diog. Laert.* de Vit. Emped. Lib. viii. Segm. 70.

of large Fires in the open Air (g). *As alſo that of* Varro, *who in a Peſtilential Seaſon at* Corcyra, *ſaved many by changing the Windows and Doors from a Southern to a Northen Poſition* (h). *Of ſo great Uſe is the Knowledge of the Cauſes of theſe, and other* Endemic Diſeaſes *to the entire Extirpation of them; according to that excellent Sentence of a forecited Author*, viz. Inveniuntur in quibus aliter atque in cæteris idem eveniat; & Cauſæ quoque Æſtimatio ſæpe Morbum ſolvit (i). *But if there was no other Reaſon aſſignable for Contemplations of this Nature, this alone is ſufficient*, viz. *That moſt Caſes, eſpecially Chronics, Phyſicians are better enabled to determine, when a Change*

(g) Auctor Lib. de Theriaca ad Piſon. cap. 16 *Actii Amedei* Tetrab. ii. Serm. 1. cap. 94.

(h) *Lemn.* de Nat. Mirac. Lib. iii. cap. 3.

(i) *Celſ.* in Pref.

Change of Air, &c. *is neceſſary, as well as what Kind will be moſt ſerviceable. It being not always the Removal from an Air generally thought worſe into one more univerſally eſteemed, but ſometimes the contrary, which will be of moſt Service in Perſuance of the various Methods of Cure, neceſſary in different Caſes and Conſtitutions; that Kind of Air as well as different Meats and Drinks, being highly uſeful to ſome in particular, which may be of ill Conſequence to others. For which Reaſon I have choſen to enumerate their different Effects without preferring one before another, leaving the Application to particular Caſes, which can never be ſo plainly laid down in general as to ſuit all particular Caſes and Conſtitutions.*

But I ſhall not trouble the Reader with more Inſtances of this Kind, what has

has been ſaid being ſufficient to ſhew, how much the Contemplation of the ſecret Springs and Cauſes of Diſeaſes, may contribute to the Cure of the moſt dangerous and fatal ones, even of the Plague itſelf. How far the following Sheets may contribute to this End I cannot determine: However if they ſhould fail of the deſired Succeſs, they may poſſibly excite ſome more able Hand, to undertake this uſeful, but neglected Part of Phyſick, by which its Errors may be corrected, and its Defects ſupplied.

OF

ENDEMIC DISEASES.

CHAP. I.

ENDEMIC Diſeaſes are generally defined by Phyſicians, to be ſuch as invade any particular Country or Place, in a more peculiar Manner than others; and owe their Origin to ſome particular Qualities of the Climate, Air, Soil, Situation, Waters, and the like.

THE Effects ſpringing from theſe Cauſes in the Animal Oeconomy, tho' little regarded, are many and ſurprizing, growing up with us even from our Cradles, and by that Means firmly rooted in our Natures, and interwoven in our very Conſtitutions. Hence ſpring great and numerous Diſeaſes, and thoſe the moſt difficult and dangerous. And indeed how can it otherwiſe happen, when the very Air we breathe, the Product of the Earth, our Meats and Drinks, eſpecially the Waters, that great Source of all our Drinks, and principal Ingredient in many other Compounds, do on this Account acquire new Qualities, and degenerate from that Purity, which is neceſſary for preſerving the Animal Oeconomy in a healthful State.

Nor are our Bodies only alter'd in Reſpect of their more ſickly or healthful State, but our Features, Complexions, and Shape of the Body dy itſelf are not a little varied, as may be obſerved in the Inhabitants of different Countries, even the very Faculties of the Mind are heigthened or depraved by them; as appears not only from the different Genius and Diſpoſitions of moſt Nations, but the numerous Obſervations of the moſt eminent Naturaliſts, and Phyſicians (a). Agreeable to which is that known Obſervation of the Satyriſt,

Vervecum in Patria craſſoque ſub
Aëre naſci.

I ſhall begin with the different Situations with Reſpect to the Air only, and take the Reſt in the Order ſet down: But before I do that, it will be neceſſary to give ſome Ac-

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(a) *Hippoc.* de Aerib. & Aq. *Galen* de Temperaturis, lib. i. & Lib. de Moribus Anim. P. viii. & ix. *Plato* in *Timæo.*

count of the Air, and its Manner of acting on a human Body, ſo far as is neceſſary to the Underſtanding of the following Pages.

THE Air is a compreſſible and expanſible Fluid, ſurrounding this terreſtrial Globe to a good Diſtance, its lower Parts are more compreſt than thoſe above, and that, in Proportion to the Denſity and Height of the incumbent Fluid.

THIS Compreſſion is the Occaſion of the greater Denſity of its lower Parts, which is always proportional to its Compreſſion; as is alſo its Elaſticity, the *Vis Centrifuga* of its Particles being reciprocally proportional to the Diſtances of their Centers (b).

(b) *Newtoni* Princip. Philoſoph. Mathem. lib. ii. p. 23.

I ſhall not trouble the Reader, either with an Eſtimate of the Air's Gravity with reſpect to other Fluids, or its Preſſure upon the Surface of our Bodies, theſe being not only done already, but the Alterations thence ariſing ſhort and variable; and tho' perhaps the Cauſe of ſome acute Diſeaſes and ſhort-lived Diſorders, yet have little or no Share in producing thoſe Effects in the animal Oeconomy, which are conſtant and permanent, as are the Cauſes of the Diſeaſes here ſpoken of, which take their Riſe from the different Proportion they bear to each other in ſome particular Places and Countries, to what they do in others, of which Kind, as are its Heat or Cold, Dryneſs or Humidity, and its greater or leſs Stock of animal, vegetable and mineral Particles.

THE Alterations cauſed in the Air by Heat and Cold, are its Rarefaction and Condenſation, by which it is obliged to fill a larger, or be crouded into a leſs Space; as is ſufficiently evident from numerous Obſervations and Experiments (c). And its Elaſticity being proportional to its Condenſation, will on this Account alſo be much altered, as appears from ſeveral Places of the forecited Author (d). This alone is ſufficient to affect our Bodies in a very ſenſible Manner, as the Air itſelf muſt neceſſarily become more or leſs fit for Reſpiration; whence the Lungs being proportionably inflated, the Blood muſt thereby become

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(c) *Boyle*'s Experimental Hiſtory of Cold.

(d) Experiments concerning the Spring of the Air.

come more or leſs capable of performing its natural Functions.

The Changes cauſed by its Moiſture or Dryneſs, are the clogging or facilitating the Motion of its Spring, whereby alſo our Reſpiration is affected, inaſmuch as the Lungs themſelves not only are more or leſs expanded, as in the former Account, but the pulmonary Fibres themſelves relaxed or contracted, and that in a greater Proportion than the reſt, both as they are conſtantly expoſed to its Effects, as alſo on Account of its more forcible Preſſure upon them in Expiration, ariſing from the Cavities of the Veſicles taken together in Proportion to that of the *Aſpera Arteria*, as might be eaſily demonſtrated from the Laws of Pneumatics, did it relate much to our Purpoſe. To which may be added its Effects in relaxing or contracting the Fibres of the Body, by which, Perſpiration the greateſt, as well as moſt uſeful Excretion of the Body, is much leſſened or encreaſed.

The Changes ariſing in the Air by the vaporous Steams and Exhalations of animal, vegetable or mineral Subſtances, depending on the different Diſpoſition of the animal Juices, the different Productions and Nature of the Soil, and various Compoſition of metallic and mineral Bodies, I ſhall refer to thoſe Places, where I ſhall particularly treat of the Changes wrought in the animal Body by their Means. Only ſo far in general I ſhall premiſe, that all vaporous Exhalations do clog its Spring, and weaken its Elaſticity (e), and produce infinite Variations in the animal Oeconomy, as they contract or relax the Fibres, ferment, diſſolve, or coagulate the animal Juices, or ſtimulate the Solids to more ſtrong and frequent Vibrations.

* * *

(e) *Boyle* of Animals ſhut up with Air in the Receiver, or Philoſph. Tranſact. N° 63. *Mead* on Poiſons, *Eſſay* 5th. *Hales* Stat. Exper.

CHAP. II.

THE Situation of Places, with Regard to their healthful or noxious Qualities, tho' much neglected by the Moderns, (the Generality of Mankind being ſolicitous in chooſing ſuch Places of Abode, as are moſt convenient for their domeſtic Affairs, and advancing their Fortunes, rather than the prolonging their Lives in Health or improving their Conſtitutions) was by the Antients thought worthy of their ſtricteſt Enquiry and Obſervation; as appears from the admirable Rules delivered by ſome of their greateſt Writers. Nay ſo very ſolicitous were they in Matters of this Kind, that as *Vitruvius* informs us, they uſed to inſpect the Entrails of Beaſts paſturing in thoſe Places, which if any Ways unſound or tainted, was not only a ſufficient Motive to prevent any deſigned Structure, but to hinder the carrying on of what was already begun.

Situations how conſidered.

The Antients divided their Situations with Reſpect to the Air, into ſuch as lay expoſed to the warm or cold Winds; which Diviſion tho' in ſtrictneſs it relates only to the Aſpects of Places with Reſpect to the Points of the Compaſs, without any Regard to the Climates; yet as the Obſervations made thereon are owing ſolely to the ſenſible Qualities of the Air bearing different Proportions to each other, they are equally applicable to all Places, where any of theſe Qualities are predominant in a remarkable Manner, whether they be delivered with Regard to the Aſpects of Places towards the Points of the Compaſs or the Situation of different Countries in different Latitudes and Climates, tho' they be not applied by them in ſo general a Manner.

Of the firſt Kind, were thoſe which came from all the Points of the Compaſs, between the Riſing and Setting of the Sun in Winter, which are moſt Points of the South-Eaſt and South-Weſt, but more ſtrictly thoſe included between the South-Eaſt by Eaſt Point, and the South-Weſt by Weſt Point of the Compaſs; and diſtinguiſhed among the *Greeks* by Ἔυρος, Ἐυρονότος, Νότος, Λιϐόνοτος, Λὶψ; among the *Latins* by *Vulturnus*, *Phænicius*, *Auſter*, *Auſtro-africus*, and *Africus*; containing, according to the preſent Diviſion of the Compaſs, the South-Eaſt by Eaſt, South-Eaſt, South-Eaſt by South, South South-Eaſt, South by Eaſt, South, South by Weſt, South South-Weſt, South-Weſt by South, South-Weſt, and South-Weſt by Weſt. Of which *Vulturnus* was eſteemed dry and warm, the reſt warm and moiſt (f).

OF the latter Sort, are thoſe coming from the Points contained between the Setting and Riſing of the Sun in Summer, which are moſt Points of the North-Eaſt and North-Weſt, but eſpecially from the North-Eaſt by North Point, to the North-Weſt by Weſt Point of the Compaſs, diſtinguiſhed among the *Greeks* by the Names, Ἀργὲστης, Θρασκίας, Ἀπαρκτίας, Βορὲας; among the *Latins*, by *Caurus* ſive *Corus*, *Circius*, *Ventus Septentrionalis*, *Aquilo*, *Euro-aquilo*, of contrary

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(f) *Plinii* Hiſt. Nat. lib. xi. cap. 47.

Qualities to the other; containing with us the North-Weſt by Weſt, North-Weſt, North-Weſt by North, North North-Weſt, North by Weſt, North, North by Eaſt, North North-Eaſt, and North-Eaſt by North.

THEY had likewiſe other Diviſions, or rather Appellations of the Winds, as the *Eteſiæ* which were Eaſterly Winds accompanying the Dog-Days (g). The *Ornithiæ* in *February*, which were Northerly Winds ſo called from the Flight of Storks and other Birds accompanying them; *Favonius* in *March*, which blew from the South-Weſt; as alſo Winds peculiar to particular Countries and Places, as *Sciron* to the *Athenians*, and the like, whoſe pernicious Blaſts from the North-Weſt, affected none elſe of the *Grecian*

(g) *Strabon.* Geograph.

Grecian States. But theſe being no Way different from ſeveral of thoſe already mentioned, except in their being peculiar to certain Places and Seaſons, I ſhall not trouble the Reader with an Account of them.

Qualities of Winds whence derived.

THE different Qualities of Winds are not to be accounted as ſo many Changes in the Nature of Air itſelf, that being only a thin compreſſible and dilatable Fluid, equally ſuſceptible of benign or noxious Qualities, but owe their Origin to the various Climates, Tracts of Earth, Water, and the like, over which they paſs. Thus the South, which with us is generally eſteemed warm and moiſt, by its paſſing the Torrid Zone and great Southern Ocean, is to thoſe in equal Latitude, on the other Side the Line, of quite contrary Qualities, and equally cold with ours from the North. On which Account, the firſt Thing neceſſary to be taken Notice of, with Regard to the Healthfulneſs of Situations in Reſpect of the Winds, is the Climate and Latitude of the Place, with Regard to Heat and Cold; thoſe Winds being noxious in one Clime, which in another may have quite contrary Qualities, agreeable to *Baptiſta Porta*'s Obſervation, *viz.* That the South Wind, which by moſt of the Antients is condemned, is not in all Places unwholeſome (h); and undoubtedly the farther any Place is ſituate toward the North, whatſoever may be the Qualities of the ſouthern Winds in warmer Regions, they will, by paſſing through a cool Climate, acquire very different, if not contrary Qualities. Hence we may, in a great

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(h) *Joan. Bapt. Port. Villæ*, lib. i. cap. 22.

Meaſure, reconcile the different Opinions of thoſe who have wrote on this Subject, ſome commending a Northen (i), others a Southern Situation (k), both which in different Climates and Circumſtances may hold true; the North Winds under the frigid Zone being more prejudicial than thoſe from the South, and *Vice Verſa.* Which Caution is neceſſary to be obſerved, it being impoſſible to determine any Thing ſo peremptorily in this Caſe, as not to be liable to particular Exceptions (l).

CHAP.

(i) *Hip.* de Aeribus *Celſ.* lib. ii. cap. 1. *Conſtantini Cæſaris* Γεωπονικῶν, lib. ii. cap. 3.

(k) *Bapt. Port.* Loc. Citat.

(l) The Editor begs Leave alſo to ſubjoin a farther Remark relative to the Subject of this Chapter, the Truth whereof has been confirmed to him by many Experiments and Obſervations in his Attendance on the *Britiſh* Army, in their various Encampments and Winter Quarters during the late War; namely, that ſuch

Places

CHAP. III.

Of Situations towards the warm Winds and their Effects in warm Climates.

THE Situations reſpecting the warm Winds, or where Heat was the predominant Quality of the Air, and eſpecially ſuch as are moiſt withal, are generally condemned by the Antients as Unwholeſome, and ſerving to relax and enervate the Body, and render it leſs

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Places as are immediately ſituated on the Sea Coaſts, or border on the Confines of vaſt Tracts of a Country inundated during ſeveral Months in the Year, or are near adjoining to either, have their Winds from the Water more humid and ſtocked with vaporous Exhalations, than from the reſt, to whatever Point of the Compaſs it is that they lie thus expoſed. Whence it is that theſe Winds are more frequently accompanied with Rains than others, and conſequently, are in general to be reputed moiſt Winds in thoſe Places, whatever Qualities they may have in others.

leſs capable of enduring the Fatigues of War, Labour, and other Accidents of human Life (m). Agreeable to this, we find the Inhabitants of the colder Regions, provided the Climate be not exceſſive, remarkable in all Ages for a more robuſt and firm Conſtitution of Body than thoſe in a warmer Climate, who in parallel Circumſtances have been found more weak and effeminate, as the Obſervations of the beſt Hiſtorians will ſufficiently convince us. And indeed 'tis the undoubted Property of Heat not exceſſive, and eſpecially when joined with Moiſture, to relax and weaken the Fibres of the

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(m) *Hippoc.* Loc. Citat. de Morb. Sacr. XV. *Aph.* p. 3. A. 5. 17. *Celſ.* Loc. Citat. *Plinii* Hiſt. Nat. lib. 2. cap. 17. *Vitruv.* lib. 1. cap. 5. *Cardan.* de Rerum Varietat. lib. 1. cap. 8. *Tho. Bartholin.* Obſ. Med. & Philoſoph. Vol. 5. Obſ. 113. pag. 294. *Lemn.* de Occult. Nat. Mirac. lib. 3. c. 3. p. 283.

the Body, whereby they become leſs ſpringy and elaſtick, and their Vibrations more weak and ſlow.

Effects of a moderately dry and warm Air.

But the Effects of Heat conſidered ſeparately from Moiſture, are much different from theſe: For this, when moderate, produces an eaſy and natural Rarefaction of the Juices, by which they are preſerved in a due Fluidity capable of paſſing the ſmalleſt Veſſels, ſupplying all the neceſſary Secretions, affording a regular Diſcharge to the perſpirable Matter, and conſequently preſerving the animal Oeconomy in a healthful State.

Effects of a hot and dry Climate.

But where the Warmth of any Situation exceeds this Standard, it becomes detrimental, and proportionably deviates from a healthful State. For the Blood being too much diſſolved by the ambient Heat, and brought in too great a Quantity toward the Surface of the Body by ſuch a conſtant *Stimulus*, the moſt ſubtile and volatile Parts will fly off in too great Quantities by the perſpirable Veſſels, and leave the Remainder more effete, groſs, terreſtrious, and vapid. Whence the Pulſe will be quick and weak, the Inhabitants feeble and incapable of enduring the Fatigues of ſtrong bodily Exerciſe. The Blood alſo by theſe Means being more charged with pungent, acrid and empyreumatic Salts and Oils, and the Particles of Heat continually imbibed into the Veſſels (n); the moſt aqueous Part of the Blood will be exhaled, and the Solids deprived of that Moiſture which is neceſſary for eaſy Vibrations; which with the abovementioned Effects, will render them

ſubject

(n) *Newton.* Optic. Quæſt. 22. *Boyle* de Ponder. grav.

ſubject to ſtrong Paſſions of the Mind, and all the Diſeaſes that depend on a hot and dry Conſtitution. Of which Kind are continual Thirſt, a languid Appetite, Coſtiveneſs of the Belly, a dark, ſwarthy, tawny or black Complexion, in Proportion to the Heat; a thin and meagre Conſtitution, much addicted to Venery, and ſubject to all inflammatory Diſeaſes, together with a Temper of Mind proud, jealous, envious and revengeful.

Effects of a hot and moiſt Situation.

Now if from hence we take a Proſpect of a Situation hot and moiſt, we ſhall find the Caſe extreamly different. For the Fibres of the Body, eſpecially ſuch as are cutaneous and moſt expoſed, inſtead of being parched and dried by the Heat, will by its being joined with Moiſture, become lax and flabby.

The Circulation of the Juices will be languid, the ſlimy and viſcous Parts of the Blood retained in greater Proportion than the reſt, and Obſtructions formed in the capillary Veſſels, more particularly in thoſe of the *Abdomen*; both on Account of the torpid Motion of the Blood in thoſe Parts, and the Laxity of the Parts themſelves.

THE Air's Spring alſo being weakened by Heat and clogged with Vapours, will be leſs able to expand the pulmonary Veſicles, the Conſequence of which muſt be a more languid Circulation, ariſing partly from the increaſed Viſcoſity of the moving Fluid, and its Inaptitude to paſs the ſmall Canals and fine Meanders of the Body; and partly from a Defect of Spirits to contract and actuate the Heart; the Quantity of minute and ſeparable Particles decreaſing, when the Number of thoſe requiſite for forming the more groſs and tenacious Fluids is much augmented. Whence alſo Obſtructions and Stagnations of the Juices muſt enſue. Which, either by ſtagnating in particular Places will obſtruct the Paſſage of the circulating Fluids, and pervert or deſtroy the Uſe of ſome of the *Viſcera*, and produce a long Train of Symptoms conſequent thereon; or by being putrified and attenuated by the Heat and Motion of the Body, will again be reſorbed into the Blood, and produce thoſe vicious Ferments viſible in putrid, malignant, and peſtilential Fevers. Hence it will be no difficult Matter to account for the Obſervations made by the Antients, on the Inhabitants of Places thus ſituate, which are the neceſſary

Conſequents of the Alterations now recited, as are a languid Appetite and weak Digeſtion, Dulneſs of the Faculties, too great Corpulency, Inactivity, Puſillanimity, pale and languid Complexions, and the like (o).

And as the natural Conſtitution of the Body is on this Account altered, ſo no leſs do the Diſeaſes, incident to thoſe People, owe their Origin to this State of the Body; of which Kind in Children are Rickets, Ruptures, Convulſions, Aſthma's; in thoſe more grown, ſcrophulous and ſtrumous Swellings, Worms, Green-ſickneſs, Obſtructions, Conſumptions; in Women, fre-

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(o) *Hippoc.* Loc. Citat. & Lib. de Humoribus, p. 8. *Galen.* de Animi Moribus, p. 8. & 9. *Plinii* Loc. Citat. Ld. *Verulam*'s *Sylva Sylvarum*, Cent. 4. pag. 38.

frequent Abortion, Barrenneſs, *Fluor albus*; in grown People, Diarrhea's, Dyſenteries, lingering and malignant Fevers, ichorous Ulcerations, Cachexies, Conſumptions, Empyema's; in older Perſons, Lethargies, Palſies, and the like: Which Diſeaſes, though found in all Kinds of Situations, are yet moſt frequent in theſe (p).

But though theſe Kinds of Situations are generally eſteemed leſs Healthful than the oppoſite, yet are they extreamly various, as they are more or leſs expoſed to the cold

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(p) *Hippoc.* de Aer. & Aphor. p. 3. Aph. 16. *Epidem.* lib. 3. *Galeni* Com. in hunc Loc. & de Temporaturi, lib 1. *Vitruvii* lib. 1. cap. 5. *Lemn.* pag. 283. & 287. *Zacut. Luſitan.* Introit. ad Prax. Præcept. 47. *Sanctorii* Med. Static. p. 2. *Aph.* 6. *Baglivi* Prax. Med. lib. 1. cap. 15. pag. 3. & 4. *Bellini* de Morb. cap. pag. 466. *Floyer* on the *Aſthma*.

Winds, as they are placed in a high or low Part of the Country, or are contiguous to large Woods, Moors, Fens, Marſhes, and the like, which either by correcting, or increaſing their noxious Qualities, render their Effects proportionally hurtful, or the contrary.

How beſt prevented.

FROM what has been ſaid it will follow, that the moſt likely Method to prevent the Inconveniences ariſing from Situations of the firſt Kind, *viz.* of a hot and dry Situation are Meats and Drinks which dilute the groſs and tenacious Fluids, cool and reſtore the Loſs of the humid Parts, carried off by too great a Perſpiration, and blunt the Acrimony of the Juices. In the ſecond, ſuch as without heating and inflaming the Body, moderately attenuate and diſſolve the viſcous Juices, and contract and ſtrengthen the decayed Tone of the ſolid Parts; moderate Exerciſes in a cool and dry Air, cold Bathing, and the like.

CHAP.

CHAP. IV.

THE Situations reſpecting the cold and dry Winds, and eſpecially where theſe predominate, though generally eſteemed by the Antients more wholeſome than the former, on Account of their being more dry and contracting, and thereby giving a greater Energy to the Fibres of the Body, are yet attended with many Inconveniences, ariſing from the contrary Extream. It is the known Property of Cold to contract and ſtiffen the animal Fibres, to condenſe and coagulate the Fluids, more eſpecially thoſe which conſiſt of oleaginous and viſcous Parts, and render them leſs fit to paſs the fine capillary Veſſels. Hence then, in very cold Climates muſt follow

Of Situations towards the cold winds and in cold Climates.

follow a too great Rigidity, and Contraction of the animal Fibres; which rendering them leſs capable of thoſe eaſy and natural Diſtenſions, which are requiſite to the Conſervation of the animal Oeconomy in its natural and healthful State, muſt increaſe their Reſiſtance to the circulating Fluids above its ordinary Pitch, diminiſh the Cavities of the Veſſels, and thereby ſubject them to Inflammations, Obſtructions, Ruptures of the capillary Arteries, Hemorrhages, and the like. Beſides the Air being condenſed, and crowded into a leſs Space by the Cold, will when admitted into the Lungs in Reſpiration, by the Warmth of the Place, be more forcibly expanded, and not a little endanger a Breach in the delicate Structure of the pulmonary Veſſels; or however, ſo compreſs and ſtreighten the blood Veſſels, as to render the Paſſage of the Blood more difficult and hazardous; whence proceed Obſtructions, Inflammations, and the like; and eſpecially if to theſe be added that greater Contraction of the pulmonary Fibres, by the immediate Application of the cold Air, which at the ſame Time ſtreightening the Cavities of the Veſſels, muſt conſiderably augment the Difficulty of the Blood's Paſſage; which it has ſometimes done to that Degree, as to throw the Party into ſwooning and fainting Fits (q). Nor are the Solids alone, but the Fluids alſo affected by an Air too cold and piercing; eſpecially the Blood, which in its Paſſage through the Lungs, being there more immediately expoſed to its Effects, will be rendered more denſe, and unfit to paſs thoſe delicate Strainers, and thereby become more apt to ſtagnate in the capillary Veſſels, ſo as not a little to contribute towards producing the forementioned Effects. For it is evident to every one how much the Blood upon its cooling does condenſe and coagulate; how great the Effect of external Cold in abating the Rarefaction of the Blood even in Maniacs, and how powerful its effects in profuſe Hæmorrhages: But what above all confirms this, is, the Inflammations and Mortifications which affect ſuch as are long expoſed to intenſe Cold, in the moſt Northern Climates.

(q) *Fabric. Hildan.* Obſerv. Chirurg. Cent. V. Obſ. 34.

THAT this is the Caſe of the Inhabitants of Places thus ſituate, is evident from the Obſervations of Phyſicians, particularly thoſe of the great *Hippocrates* (r), all which ſhow a great Tenſity and Rigidity of the Fibres, as are a rough, fierce, and cholerick Diſpoſition, Strength, and Activity of Body, the eaſy enduring great Fatigues, a voracious Appetite, and ſtrong Digeſtion and the like (s). Nor does this appear only by the general Diſpoſition and Conſtitution of thoſe People, but alſo by the Diſeaſes to which they are particularly ſubject, of which Kind are acute Fevers, Pleuriſies, Peripneumonies, Suppurations, and Ulcers of the Breaſt and Lungs, Stranguries, Angina's, Ophthalmia's, Epilepſies, profuſe Bleedings at the Noſe in young Perſons during the Summer Months, Barrenneſs in their

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(r) De Aer. Aq. & Loc.

(s) *Hippoc.* loc. citat. *Galen.* de Temperamentis, l. 2. p. 12. & lib. *quod Animi Mores Corporis Temperaturas ſequuntur*, p. 89. *Sanctorii Med. Stat.* p. 2. Aph. 1, 7.

Women, not as in the former from the Laxity of the Fibres, and cachectic Habit of Body, but their too great Rigidity, and frequent Suppreſſion of the menſtrual Purgations (t).

Hippocrates indeed adds Longevity as a Salvo to the Inconveniences accruing from theſe Situations, which it is not improbable may in general hold true. For, not only the natural Frame and Conſtitution of the Body is more firm and robuſt, and therefore if it eſcape the above-named acute Diſeaſes, which moſt frequently happen in Youth, or the Middle-age, is the more likely to hold out to a longer Period; but the ſame great Author has obſerved, which is alſo unanimouſly confeſſed by Phyſicians, that lean People, and ſuch are generally found in thoſe Situations (u), are commonly longer lived than thoſe of a more groſs, fat, and phlegmatic Conſtitution (w), which are moſt frequently found in a moiſt and foggy Air. And I believe the general Accounts of Longevity will confirm thus much, that the Inhabitants of a cold, dry and clear Air, do *cæteris paribus* hold out to a longer Term of Life, than thoſe who live in a moiſt and foggy one, whether warm or cold (x). Nor is it leſs probable, notwithſtanding *Ariſtotle*'s Opinion to the con-

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(t) *Hippoc.* de Aer. Lib de Humorib. viii. De Morb. Sacr. xv. Aph. Sect. iii. Aph. 5, 7, 17.

(u) Loc. Citat.

(w) Aphor. Sect. iii. Aph. 44.

(x) Philoſoph. Tranſact. N° 44. p. 886. N° 221. p. 266. & 267. N° 228. p. 543. N° 160. p. 597. N° 261. p. 502. Ld. *Bacon*'s Hiſt. of Life and Death. *Plot*'s Hiſt. of *Oxfordſhire*, cap. ii. pag. 1, 2, 3. Of *Staffordſhire*, cap. viii. *a* Sect. 91. *ad* 107.

contrary (y); that the Inhabitants of the Northern and cold Countries, exceed the Age of thoſe inhabiting the more hot and parching Climates. *Joan. Leo* açquaints us, that the Lives of the Negroes are exceeding ſhort (z), and *Archigenes* and *Creſcentienſis* aſſure us, that they are old at Thirty (a); nor is it improbable that the ſcorching Heat of the Sun in that Clime, ſhould by evaporating the more thin and uſeful Juices, incraſſating the Remainder, and deſiccating the ſolid Parts, ſooner exhauſt the Body, and bring it to a more early old Age.

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(y) *Lib.* de Long. & Brevitat. Vitæ.

(z) Deſcription of *Africa*, lib. i.

(a) *Petri Creſcentientis* de Agricult. lib. i. cap. 5.

How beſt prevented.

THE moſt probable Means to prevent the Inconveniences ariſing from Situations of this Kind, all which take their Riſe from a too great Rigidity and Contraction of the ſolid Parts, and Condenſation of the Fluids, as has been already ſhown, muſt be ſuch as are capable to relax and ſupple the too ſtiff and inflexible Tone of the Solids, and diſſolve the condenſed and coagulated Fluids; of which Kind are Meats and Drinks moderately diluting and relaxing, eſpecially ſuch taken actually warm, warm Bathing frequently repeated, Care being always taken ſo gradually to cloſe the Orifices of the perſpirable Veſſels as to prevent the Inconveniences which might ariſe from the ſudden Application of the cold Air, and giving an immediate Check to the perſpirable

Matter,

Matter, than which nothing can be more diſadvantageous.

Effects of a cold and moiſt Situation.

Now if we ſuppoſe the Air to be not only cold, but moiſt withal, we may at the firſt View diſcover the miſchievous Properties of a Situation of this Kind, wherein the Effects of both conſpire to produce ſome of the moſt obſtinate Maladies that afflict Mankind. For the Air being not only cold as in the preceeding Caſe, muſt on that Account have an ill Effect upon the Blood in its Paſſage through the Lungs, but being clogged with Vapours, will be ſo abated in its elaſtic Force, as not ſufficiently to expand them, and divide the Globules of the Blood in ſuch Manner as to render them fit for Circulation. Whence ſome of its moſt viſcous Parts remaining in the Veſſels of the Lungs themſelves, will obſtruct thoſe Paſſages, and produce Coughs, pituitous and aſthmatic Diſeaſes.

The Pulſe alſo moving too ſlow from the Cold, and the Elaſticity of the Fibres being depraved by too much Humidity, afford great Opportunity for forming the more viſcous Fluids, and eſpecially in thoſe Parts of the Body, which are indued with little Elaſticity, and where the Impetus of the Blood through the numerous Ramifications of the Arteries is very much abated: Both which will happen in the Meſenteric Veſſels, whence of neceſſity, follow ill Digeſtions, flatulent, and hypochondriac Diſorders, Obſtructions of the Liver and Spleen, Jaundices, Aſcites, Tympanites, Anſarca, a cachectic and ſcorbutic

Conſtitution, ſcrophulous and ſtrumous Swellings, and the like.

The nervous Fluid being likewiſe ſeparated in leſs Quantity, and leſs fit for the Purpoſes of Life, the Inhabitants of theſe Places muſt be naturally dull, ſtupid and unactive, ſubject to Vertigoes, Lethargies, Palſies, and all thoſe Diſeaſes, which depend on the Relaxation of the Nerves, and Inaptitude of the nervous Liquor to perform its natural Functions. To theſe alſo may be added, the Loſs of Elaſticity in the Solids themſelves from the humid Diſpoſition of the Air, which being conſtantly applied, renders them too ſupple, and weakens their Vibrations. Perſpiration alſo being leſs free than in a clearer Air, the Veſſels will be diſtended with watry and viſcous Juices, eſpecially about the Abdomen, and the Inhabitants be large-bellied, dull, fat, phlegmatic and ſtupid.

How beſt prevented.

THE beſt Methods to prevent the Inconveniencies accruing from a Situation of this Kind, are Meats and Drinks moderately drying and attenuating, much Exerciſe, Friction, ſweating in a Stove or Bagnio; and the like.

CHAP. V.

Of an Eaſtern Situation.

BESIDES the preceeding general Kinds of Situations, the Antients had alſo two others, which tho' generally by them applied to the Air, relate more ſtrictly to the Poſition of the Place, in Reſpect of the Sun, and his Riſing and Setting upon it. The Situations here ſpoken of are, *Firſt*, Such as reſpect that Part of the Compaſs, between the Riſing of the Sun in Summer and Winter, which are thoſe contained between *Aquilo* and *Vulturnus*, or thoſe between the North-Eaſt by North, and the South-Eaſt by Eaſt, called by the *Greeks*, Καικίας, Ἀπηλιώτης; by the *Latins*, *Cæcia* and *Subſolanus*, containing according to the preſent Diviſion of the

Compaſs, the North-Eaſt, North-Eaſt by Eaſt, Eaſt North-Eaſt, Eaſt by North, Eaſt, Eaſt by South, and Eaſt South-Eaſt. *Secondly*, Thoſe reſpecting the Points between his ſetting in Winter and Summer, *viz.* between *Africus* and *Corus*, containing the Weſt South-Weſt, Weſt by South, Weſt, Weſt by North, and Weſt North-Weſt.

Of theſe the Eaſterly Situation was always eſteemed by the Antients moſt wholeſome, and preferable not only to its oppoſite, but likewiſe to the four laſt deſcribed, whether hot or cold. But herein it is to be conſidered, that the Obſervations of this Kind were made by the Inhabitants of warm Climates, and conſequently Allowances muſt be made in ſuch as are ſituate in colder, approaching proportionally nearer the South, as the Climate requires, agreeable to the Advice of one of the greateſt Architects which this Age has produced (b). The Advantages accruing from a Situation of this Kind, are a more early Diſſipation of the Dews and Vapours condenſed by the Cold of the preceeding Night, upon the Approach of the Morning-Sun, which otherwiſe by their Stay would clog the Air's Spring, and render it leſs fit for Reſpiration; and not only ſo, but the perſpirable Matter, which in the Morning ought to paſs off moſt freely and eaſily, will by the vaporous Steams and condenſed Exhalations clogging the Motion of the cutaneous Fibres, and obſtructing the Orifices of the Veſſels, be in ſome Degree intercepted; both which Inconveniences in theſe Kinds of Situations are, for the Reaſons already mentioned, in a great Meaſure prevented. This holds true not only with Regard to Situations of Buildings, but even in thoſe of Vegetables, whoſe Fruit and Bloſſoms are always found moſt fair and forward in ſuch Situations, as have the Morning Dews early diſperſed.

(b) *Andr. Pallad.* Architect. lib. ii.

ANOTHER, and that no ſmall Advantage, is the more equal Temperature of the Air, with Regard to Heat or Cold, the Extremities of which, ſo far as the Climate will allow or requires, being beſt avoided by a Situation of this Kind, and the Inconveniences ariſing either from hot and pernicious Guſts of Wind from the South in hot Climates, and the chilling Blaſts from the cold Winds in a great Meaſure prevented, or rendered of leſs fatal

Conſequence. *Hippocrates* (c) remarks of the Inhabitants of theſe Places, that they are generally well complexioned, of a florid Countenance, a clear Voice, a quick and ready Wit, and the Diſeaſes to which they are ſubject, few, ſhort, and eaſily vanquiſhed; ſeveral of which are likewiſe obſerved by *Galen* (d).

THE ſame great Author, as alſo others of the Antients, compare a Situation of this Kind for its Salubrity to the Spring of the Year, and the ſalutiferous Qualities attending that more than other Seaſons, and indeed not without Reaſon, the Morning-Sun diſpelling the cold and damp Vapours, correcting the

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(c) *Lib. de Aer. Aq. & Loc.*

(d) *Lib. quod animi mores Corporis Temperaturas ſequuntur*, pag. 8, 9.

Coldneſs of the Air, affording a free and eaſy Diſcharge to the perſpirable Matter, and thereby exhilarating the Spirits, and enlivening the whole animal Oeconomy, in the ſame Manner as the approaching Warmth of the vernal Sun, diſſolves and rarefies the coagulated Juices, unlocks the Pores both of Plants and Animals ſhut up by the Winter's Cold, and gives freſh Life and Vigour to the whole animal and vegetable World. And I doubt not, but it is on this Account, as well as to prevent Damps and Mouldineſs, that *Vitruvius* orders all Libraries a Situation of this Kind (e), nothing contributing ſo much to a ſedate, eaſy and cheerful Diſpoſition of Mind, as a regular and free Perſpiration.

(e) *De Architect.* lib. vi. cap. 7.

BUT notwithſtanding this Situation, as reſpecting the Morning Sun, is preferable to the reſt, for the Reaſons already given, yet ought we to be herein guided by the Climate and Latitude of the Place, approaching or receeding from the warm or cold Winds, in Proportion to the Warmneſs or Coldneſs of the Country: Agreeable to which is the Doctrine of *Pliny*, who in hot, cloſe, and ſultry Countries adviſes a Situation towards the North, in cold ones toward the South, and an Eaſtern to thoſe inhabiting a temperate Clime, *viz. Spectare in Æſtuoſis locis Septentrionem debet, Meridiem in frigidis, in temperatis Exortum Æquinoctialem* (f).

(f) *Plinii* Nat. Hiſt. lib. xviii. cap. 6.

HENCE then conſidering the Latitude of this Country, with Reſpect to *Greece* or *Italy*, where the beſt Obſervations relating to Situations were made, it cannot be amiſs to approach much nearer toward the South, whoſe Qualities whatever they may be in hot, ſultry Countries, are to be eſteemed here of a more mild and healthful Diſpoſition: Nor is this leſs agreeable to the Advice of *Palladio*, who would have all Buildings to front the South, ſo as to enjoy the Morning-Sun in Winter, but turned a little from the Winter Weſt, the better to avoid the Summer Heats; his Words are *Totius Fabricæ tractus unius lateris longitudine in quo frons erit Meridianam partem reſpiciat, in primo angulo excipiens ortum ſolis hyberni, & paululum ab occidente*

cidente avertatur hyemali; ita proveniet ut per hyemem ſole illuſtretur, & calores ejus æſtate non ſentiat (g).

(g) *Rut. Pallad.* de Re Ruſtica, cap. viii. de *Ædificio.*

CHAP. VI.

Of a Weſtern Situation.

AS the preceeding Situation is by moſt Authors judged the moſt healthful and pleaſant, ſo its oppoſite, *viz.* that reſpecting thoſe Points between the Setting of the Sun in Winter and Summer, the particular Points of which I have already recited, is reputed of no leſs contrary Qualities. For, in a Situation of this Kind, it muſt neceſſarily happen, that the Morning-Sun will be for ſome Time intercepted, and the Dews and Vapours condenſed by the Cold of the preceeding Night, which ſhould be early diſperſed, hang longer in the Air, which joined with its Coldneſs through the Abſence of the Sun, muſt neceſſarily contract the Fibres, incraſſate the Fluids, obſtruct the cutaneous Paſſages, and in a great Meaſure prevent the due Expulſion of the perſpirable Matter. This greater Quantity will, by its Reſiſtance to the circulating Fluids, and Weight on the Sides of the Veſſels, gradually diſtend their Coats beyond their natural Pitch, which abating the Strength and Frequency of their Vibrations, muſt retard the Velocity and Force of the circulating Fluids, ſo that returning more ſeldom to the Lungs, they will be leſs broken and divided, and thereby neceſſarily become more viſcous, and unfit to form the fluid Secretions. Whence the Quantity of animal Spirits decreaſing, the Heart muſt be leſs frequently and ſtrongly contracted, the Impetus of the circulating Fluids upon each other much abated, and the whole Maſs become more viſcous,

cous, and apt to form ſuch Coheſions, as are by no Means conſiſtent with a healthful State, but either pervert, or deprive us of the Uſe of ſome of the Viſcera, or by obſtructing the Paſſage of the more thin Liquids, force them to corrode and penetrate the Coats of ſuch Veſſels as are more tender and delicate, or by ſtretching the Pores beyond their uſual Dimenſions, to ſeek new and unnatural Paſſages. The Particles of Cold alſo penetrating the very Veſſels themſelves, will coagulate the animal Juices, increaſe their Viſcoſity, retard the Circulation of the Fluids, and very much promote the abovementioned Effects.

HENCE it will be no difficult Matter to account for all the Inconveniences attending a cold, moiſt, and foggy Air; of which Kind are, Dulneſs and Stupidity, Rheums, Coughs, Defluxions, Hoarſneſſes, pale and languid Complexions, Loſs of Appetite, Inactivity, a cachectic and ſcorbutic Habit of Body, ſcrophulous and ſtrumous Swellings, Agues, eſpecially Quartans, lingering Fevers, Dropſies, Jaundices, Aſthma's, Obſtructions, Conſumptions, and the like (h).

Besides the Inconveniencies here mentioned, depending on the Coldneſs and Moiſture of the Morning Air, there are others depending on its ſudden Change from the Riſing of the Sun upon them, which muſt neceſſarily be advanced ſome Part of his Courſe, before they be viſited by his Rays. Which ſudden and great Degree of Heat, joined with the Moiſture of the Air, will ſubject them beſides the Diſeaſes already mentioned, to thoſe attending a hot and moiſt Diſpoſition of the Air, eſpecially putrid, malignant, and peſtilential Fevers, Fluxes of the Belly, Dyſenteries, and the like, which in the Summer muſt frequently attend them (i). And in ſhort they will, directly contrary to the Rule of *Palladio* (k), be deprived of the comfortable Warmth of the Sun in Winter, and expoſed to his moſt ſultry and ſcorching Heats in the Summer Months, which contrary Qualities muſt neceſſarily be the Parents of many and dangerous Diſeaſes.

(h) *Hippoc.* de Aer. &c. Lemn. Loc. Citat. *Vitruv.* Loc. Citat. Sanctorii Med. Static. pag. 2. *Aph.* 60. *Sydenham* de Feb. Intermit. *Wainwright*'s Nonnaturals, p. 69. *Floyer* on the *Aſthma.*

(i) *Hippoc.* Loc. Citat. Epidem. i. p 2. *Galeni* Com. in hunc Loc. *Celſ.* Loc Citat.

(k) *Rut. Pallad.* de Re Ruſtica, Loc. Citat.

As the former Situation is by the Antients compared to the vernal, ſo is this to the autumnal Seaſon, which being commonly cold, moiſt, and unequal, incraſſates the Juices both of Plants and Animals, almoſt wholly diſrobing the former, and being the conſtant Harbinger of innumerable Maladies and Diſeaſes to the latter. Whence it is no Wonder, that Phyſicians have obſerved the ſame Diſeaſes which are the Conſequents of this Situation, to be likewiſe familiar to an autumnal Seaſon, both of them being cold, moiſt, and uncertain.

Effects of it how beſt prevented.

The moſt likely Means to prevent the Inconveniencies attending a Situation of this Kind, are Meats and Drinks which attenuate the viſcous Concretions, preſerve the Tone of the Solids, and promote the regular and conſtant Expulſion of the perſpirable Matter, frequent and ſtrong Exerciſes, cold Bathing, the Uſe of the Bruſh, and the like.

WHAT has been ſaid upon theſe ſix Kinds of Situations with Relation to the Temperature of the Air, the Winds, and their Qualities, excluſive of any Alterations from the adjacent Countries, may be ſo eaſily, at leaſt ſo far as is neceſſary, applied to any particular and intermediate Points of the Compaſs, as they are more or leſs diſtant from the Extremities of each Diviſion, that it would be only trifling with the Reader to inſiſt upon them, and eſpecially conſidering the infinite Variety of Situations, with Regard to the Nature and Poſition of the Country adjacent, being on different

Sides either hilly, rocky, woody, open, hollow, dry, watry, and the like. Whence it may ſo happen, that thoſe Parts, which according to the general Qualities of the Winds, are ſituate toward the dry Winds, may by being contiguous on that Side to large Fens, Bogs, Lakes, Seas, *&c.* have the general Qualities of the Winds, if not contrary, yet very different from thoſe of the neighbouring Parts, whoſe Situations are very different in this Reſpect. I ſhall therefore in the next Place conſider the Nature and Effects of Situations with Regard to the Qualities, and Poſition of the Country adjacent, agreeable to the Advice of *Creſcentienſis*, viz. *Qui loca eligit habitabilia, cognoſcere debet quomodo ejus exiſtit diſpoſitio ſecundum altitudinem & profunditatem, diſcooperturam & cooperturam*

—*& ſi ſit Ventis expoſita, aut in Terra profunda* (1), *i. e.* Whoever chuſes a Seat ought to conſider its Situation, whether on a Hill or in a Vale, open to the Weather or cloſe ſheltered; expoſed to the Winds, or in a low hollow Country.

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(1) *Petr. Creſcentienſ.* de Agricult. lib i. cap. 5.

CHAP.

CHAP. VII.

Of Situations in reſpect of the Country adjacent.

THE Situations of Places differ in Reſpect of the Qualities of the Soil and Country adjacent; *Firſt*, As an Iſland, or Part of a Continent, as more remote, or immediately adjoining to Seas, Lakes, Rivers, and the like. *Secondly*, As they are high, low, flat, hollow, open, woody. *Thirdly*, From the Nature and Qualities of the Soil, whether dry, moiſt, ſandy, Clay, marly, ſtony, mooriſh, boggy, marſhy, ſcanty or abounding with Metals, Minerals, Grotto's, Vulcano's, Springs, Lakes, Rivers, &c.

Of Iſlands and Continents.

THE Difference in the Air of Places ſituate in Iſlands, from thoſe far up in the Continent, is chiefly owing to the greater Humidity of the former, ariſing from the Vapours exhaled out of the adjoining Seas; which being either carried along with the Winds, in the Form they are exhaled, into the adjoining Parts, clog the Air's Spring, and render it leſs fit for the neceſſary Uſes of human Life; or being buoyed up higher in the Air, paſs in the Form of Clouds farther up into the Country, which being obſtructed in their Motion by Hills, Rocks, Mountains, or other Accidents, fall down in Showers on the ſubjacent Country: A great Part of which being again exhaled, and carried up into the Air by the Rays of the Sun, muſt clog its Spring and increaſe its Humidity. That the Air muſt be vaſtly different on this Account, is evident from the Experiments and Computation of the

Quantity of Vapours exhaled by the Sun, publiſhed by the ingenious Dr. *Halley* in the Philoſophical Tranſactions (m).

Besides its commonly known, that Froſts in Iſlands, though placed in the ſame Latitude with the inland Parts of a Continent, are always leſs ſevere, the Snows leſs frequent, and of ſhorter Duration, both which are owing ſolely to the greater Humidity of the Air, which in the one, during the Winter, is commonly dry, clear, and froſty; in the other, moiſt, foggy, and filled with Vapours. This is alſo evident from the ſpeedy melting of Snows on the Sea-coaſts, where alſo the Froſts are leſs ſevere and ſharp, than in the inland Parts of the ſame Country. Conſonant to this is the Obſervation of *Strabo* on

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(m) Nº 189, pag. 368.

on this Iſland, which he aſſerts to be more ſubject to Rains than Snows (n): Which can be owing to no other Cauſe but the greater Humidity, and leſs freezing Quality of the Air. Agreeable alſo to this is that of *Julius Cæſar* (o), where he compares the Air of this Country with that of *France*, and aſſerts the leſs Severity of its Froſts. To which alſo *Tacitus* agrees, when he blames the Air as thick and foggy, from the frequent Clouds and Rains (p).

THIS greater Humidity and leſs Degree of Coldneſs in the Air of Iſlands, in Reſpect of that of Continents ſituate in the ſame Degree of Latitude, and in other Reſpects perfectly equal, is farther confirmed by numerous Inſtances and Obſervations of the moſt celebrated ancient and modern Authors (q), who aſſign the ſame Reaſons for it which I have done.

(n) *Strabon.* Geogr. lib. iv.

(o) *Julii Cæſaris* Comment. lib. v. *de Bello Gallico.*

(p) *Tacit.* de Agric. cap. xii.

THE Difference then of the Air of Iſlands in Reſpect of that of Continents, conſiſting chiefly in its Humidity, and greater Stock of vaporous Steams and Exhalations, muſt neceſſarily render the Inhabitants of the former, ſubject to the Diſeaſes attending a moiſt and foggy Air, either warm or cold, in Proportion to the Heat or Coldneſs of the Climate, Latitude of the Place, and the like; which Diſeaſes being already enumerated, I ſhall not trouble the Reader with an Account of them.

(q) *Hippoc.* de Diet. lib. ii & iii. 6. *Celſ.* lib. ii. cap 1. *Antyllus de Differentia Aeris ſecundum locos in* Joan. Stobæi *de Sanitate* 99. Ld. *Bacon's* Nat. Hiſt. Cent. iv. 383. *Camden's Britannia*, pag. 2, 3. *Bartholini* Act. Med. vol. v. obſ. 113. *De Aere Haunienſi*, p. 298.

Of Situations on the Sea-Coaſts.

WHAT has been ſaid of Iſlands, in Reſpect of the Continent, may for the moſt Part be applied to ſuch particular Places as are ſituate on the Sea-coaſts; in Reſpect of thoſe higher up in the Country, whether Iſland or Continent, with this only Difference, that the ſaline Particles, which by the Force and Daſhing of the Waves, and Violence of the Winds, are thrown up into the Air, and float in it, and are of a drying and attenuating Nature, do in Places immediately ſituate on the Sea-ſhore, very much correct the Humidity of the Air, and ſometimes ſo over-power its Force, as to render the Air of theſe Places drying and contracting. On which Account, the Antients often re-

moved

removed their Patients, afflicted with dropſical and oedomatous Swellings, Ulcers, Defluxions, and the like, into theſe Airs (r).

The greateſt Inconvenience attending theſe Situations is the Scurvy, to which they are all ſubject, who inhabit the Sea-coaſts, ariſing partly from the ſaline Particles floating in the Air, and partly from the Saltneſs of their Diet, the greateſt Part in theſe Places being Seafaring Men. It is the undoubted Property of Sea-Salt to harden the Fibres of fleſhy Subſtances, by which they become more difficult of Digeſtion, and form a Chyle more groſs and acid, as well as leſs capable of a perfect Union with the natural Juices, which are of a more mild and ſoft Diſpoſition.

(r) *Cæl. Aurelian. Morb. Chron.* lib. iii. cap. 8. *Stobæi* loc. citat. *Aetii Tetrab.* 1 Serm. 3. cap. 162.

On which Account the Solids being ſtimulated by the pungent Salts, cauſe Itchings and cutaneous Eruptions. The ſaline Particles alſo rarifying and uniting with the viſcous Juices, and rendering them acrid and pungent, whence the more groſs and grumous Part of the Blood, not being ſufficiently divided through its unequal Texture, will be apt to ſtagnate in the capillary Veſſels, and cauſe red, black, blue, and livid Spots; and the more thin and acrid Part by its Pungency corrode the Veſſels, whence, as well as from the former Cauſe, will proceed Itchings, cutaneous Eruptions, rotten Gums, ſtinking Breath, rheumatic Pains, and the like.

BUT much worſe ſtill than theſe, are thoſe Situations which are contiguous to ſuch Waters, as either conſtantly, or for the moſt Part ſtagnate and putrify, and thence not only fill the Air with noiſome and offenſive Vapours, but prove often the immediate Cauſe of putrid, malignant, and peſtilential Fevers, nay even of the Plague itſelf (s). Which Effects will be different in reſpect of the Climate, the Fætor and Corruption of the Waters being much greater in a hot, than cold Country; as alſo from the Poſition of the Place and Waters, with Regard to the warm or cold Winds: The Warmth and Humidity of the Southern Winds, joined with the Vapours ariſing from the Waters, diſpoſing the Inhabitants of ſuch Places more to the Diſeaſes which depend on a warm and moiſt Air, as thoſe who are ſituate toward the cold Winds, are to the contrary.

(s) *Diog. Laert.* lib. viii. ſegm. 79. *Boyle* of the Saltneſs of the Sea.

CHAP. VIII.

THE Effects ariſing from a Situation in Reſpect of its being placed in a high, or low Part of the Country, may be reduced to the greater Clearneſs and Coldneſs of the Air of the former, and the contrary Qualities of the latter, and its greater or leſs Preſſure on the Surface of our Bodies.

Of Situations on a moderate Aſcent.

THAT the Air of Places ſituate upon a moderately riſing Ground is more dry, clear, and healthful, and conſequently more eligible, than that of thoſe in a low Part of the Country, will, I believe, be denied by none, the Air being more agitated, and Vapours diſperſed by gentle Breezes, the Soil more dry, and the

Waters, which generally in low Countries ſtagnate and putrify, paſſing off in quick and rapid Streams, both which are abſolutely neceſſary to a healthful Situation; yet an Exceſs in Height is attended with Conſequences equally hurtful with thoſe of the loweſt Situations, the Air on the Tops of the higheſt Hills being neceſſarily unhealthful, and equally, if not more unfit for Reſpiration, than that of the loweſt Vallies.

Of the Air on the Tops of very high Hills.

For, the Air of ſuch Places being conſiderably more light, rare, and thin, as appears by the ſubſiding of the Mercury in the Barometer (t), in Proportion as has been demonſtrated by Sir *Iſaac Newton* (u), to the Height to which it is raiſed, above the plain Surface of the Earth, will not only by its too great Lightneſs become unfit to counterbalance the Heart, and Muſcles ſerving to Reſpiration, but its Elaſticity which is proportional to its Denſity, and Preſſure of the incumbent Fluid, muſt be proportionally abated (w). Hence the Veſicles of the Lungs will not be ſufficiently expanded, the ſanguineous Globules leſs broken, and the Paſſage of the Blood through them more difficult, the Conſequence of which muſt be Difficulties of Breathing, Aſthma's, Obſtructions, and Ruptures of the pulmonary Veſſels, ſpitting of Blood, Conſumptions, Empyema's, Pleuriſies, Peripneumonia's, and the like.

(t) *Philoſoph. Tranſact.* N° 299. p. 582. N° 236. p. 2. Mr. *Lock*'s Letter in Mr. *Boyle*'s Hiſtory of the Air.

(u) *Princip. Philoſoph. Mathem.* lib. ii. prop. 23.

(w) See Chap. I.

THAT a conſiderable Degree of Denſity in the Air is requiſite to the well being of an Animal, is ſufficiently evident from numerous Experiments of Mr. *Boyle*, on different Animals incloſed with rarified Air in the Receiver (x), as alſo from thoſe incloſed *in Vacuo*, the Veſicles of whoſe Lungs upon Diſſection are found cloſe ſhut, and perfectly exhauſted of Air, and not like thoſe of other Animals to ſwim in Water, but immediately ſink to the Bottom. This is farther evident from what the ingenious Dr. *Keil* has demonſtrated of the different Preſſure of the Air, in Proportion to its Denſity, on the Subſtance of the Lungs (y); which compared with Dr. *Halley*'s Computation of the falling of the Mercury at different Heights, publiſhed in the Philoſophical Tranſactions (z), it will follow, that the Difference of the Air's Preſſure on the Lungs on the Top of Mount *Teneriff*, ſuppoſing it two Miles and a half high, as by the beſt Accounts it is ſaid to be (a), from that on the plain Surface of the Earth, will be equal to one Third of its whole Preſſure on them; whence it will follow, that Air ſo extreamly thin and rare muſt be proportionally unfit for Reſpiration. This will ſtill farther appear, if we conſider that weak, conſumptive, and aſthmatic People find no ſmall Difficulty of breathing upon the common Alterations of the Barometer, whoſe greateſt Variation amounts to no more than

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(x) Pneumatical Experiments, or Philoſophical Tranſactions, N° 63. pag. 2036.

(y) *Animal Secretion*, pag. 22 & 27.

(z) N° 184. pag. 104.

(a) Account of Mount *Teneriff* in Mr. *Boyle*'s Hiſt. of the Air.

three Inches, and the Variation of the Air's Preſſure thence ariſing, will be only as ten to a hundred.

Nor is this Inaptitude of the Air of the higheſt Hills for Reſpiration found leſs demonſtrable from Fact, and the Teſtimony of thoſe, who have aſſayed to climb to the Tops of them. *Joſephus Acoſta* tells us, that going up a high Mountain in *Peru*, both he and his Companion were taken with Vomitings of Blood which laſted till they came to an Air more denſe, and convenient for Reſpiration. Mr. *Boyle* alſo tells us of ſeveral, who in climbing to the Tops of Mountains were taken with Difficulties of Breathing, Vomitings, Sickneſs, and the like (b), ſo as not to be able to reach the Top. I ſhall not need to mention the ſevere

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(b) Loc. Citat. and Account of Mount *Teneriff.*

Cold, and almoſt conſtant Snows which are found on the Tops of the higheſt Hills, there being none I believe who would chuſe a Situation on the Tops of the *Alps*, or *Pyrenean* Mountains: What has been ſaid on this Head, being I believe ſufficient to convince the Reader, that an Exceſs in this Kind, may be equally prejudicial with the loweſt Situations; and that it is not the great, but moderate Height above the neighbouring Country, that contributes chiefly to the Salubrity and Pleaſure of the Situation (c).

VARRO indeed and *Porta* both commend a high and lofty Situation (d), but the Reaſons there given being only that the Air may be agitated, and kept from Stagnation by Winds and gentle Breezes, their Deſign is ſufficiently anſwered by a moderate Aſcent; whereby the ſevere Cold, and other Inconveniencies of a too high, as well as Humidity of a low Situation, are beſt prevented. But in this the Temperature of the Climate ought principally to be conſidered, a high and lofty Situation, in very hot and ſultry Countries, if kept within tolerable Bounds, being by Reaſon of its Coolneſs preferable to the other, which in colder Climates will by no Means hold true, through the Severity of the Weather. It is I think needleſs to enumerate the Effects of a too cold Situation on our Bodies, as thoſe which are very high muſt be, though not to that Degree as immediately to affect our Reſpiration;

(c) *Andr. Pallad.* Architect. lib. ii. c. 12.

(d) *M. T. Varron.* de Ruſtica, lib. i. cap. 2. *Joan. Bapt. Port. Villæ*, lib. i. cap. 22.

tion; the Habit of Body, Diſpoſition of Mind, and Diſeaſes conſequent thereon, exactly agreeing with theirs of a cold Situation, which I have already deſcribed.

Air of Vallies.

WHAT has been ſaid of the Rarity and Thinneſs of the Air on the Tops of Hills, will be a ſufficient Proof of its Denſity in the loweſt Vallies, agreeable to that of *Seneca*, *Omnis Aer quo propior eſt Terris hoc craſſior, quemadmodum in Aqua & in omni Humore Fæx ima eſt; ita in Aere ſpiſſiſſima quæque deſidunt* (e), i. e. Air the nearer it is to the Earth, is by ſo much the more groſs and heavy, as the Fæces in Water, or any other Liquor, ſink to the Bottom; with this only Difference, that there are no Vallies ſo much below the general Surface of the Earth, as the Hills are above it, and conſequently the Denſity of the Air in the loweſt Vallies, muſt be much leſs above the healthful Standard, than its Rarity on the Tops of the higheſt Hills. Whence it is that the Air in the loweſt Vallies, does not immediately, equally affect us, with that on the Tops of the higheſt Hills, though an Air conſidered only as too denſe and heavy, is not without its Inconveniences; which are its too great Preſſure upon, and Expanſion of the pulmonary Veſicles, whereby their delicate Structure is endangered, and the Compreſſion of the ſanguineous Veſſels perhaps ſo far increaſed, as not a little to obſtruct the Paſſage of the Blood through them. This will be more ſenſibly felt by aſthmatic and conſumptive People, the Fibres of whoſe Lungs being weak and tender, will be leſs able to reſiſt this increaſed Preſſure, and by being expanded beyond their natural Pitch, be gradually worn thinner, and thence a Breach of the Veſſels, and Conſumption enſue. The Air alſo being confined by the Hills on each Side, ſuch Places will be ſubject to ſtrong and ſudden Currents of Wind along the Tract of the Valley according to its Poſition, which will not a little contribute to produce this Effect.

(e) *Nat. Quæſt.* lib. iv. cap. 10.

NOR are theſe the only Inconveniencies attending an Air too denſe and heavy; for the Preſſure on the Surface of the Body, from the Weight of the incumbent Fluid being increaſed, the Reſiſtance to the circulating Fluids toward the Surface of the Body will be augmented, and a greater Quantity flow to thoſe Parts where there is leaſt Reſiſtance. Now the Preſſure of the Air on the Brain being taken off by the Cranium, a greater Quantity muſt be forced into that Part, and Obſtructions and Ruptures of the Veſſels frequently enſue in its capillary Arteries, from their exceeding fine and delicate Structure; whence proceed Head-achs, Vertigo's, Lethargies, Palſies, Apoplexies, and the like. Which Symptoms will more eſpecially happen to ſuch as are of a groſs, fat, and corpulent Habit of Body, and indulge themſelves in Eaſe and Luxury; the Veſſels being hereby rendered more turgid, the Blood more viſcous, and apt to ſtagnate in the capillary Veſſels.

Now if to what has been ſaid of the greater Denſity and Weight of the Air, be added its greater Humidity, cauſed by Fogs and Damps, ariſing from the great Quantity of ſtagnating

Waters, which muſt neceſſarily be found in Vallies and low Situations, through the Want of a ſufficient Deſcent, it muſt inevitably happen, that the Tone of the Fibres will be relaxed, and the regular Expulſion of the perſpirable Matter obſtructed: Whence, beſides the Diſeaſes already mentioned, the Inhabitants will be ſubject to a long Train of Maladies, attending a moiſt and watery Situation, as are lingering and intermitting Fevers, Aſthma's, Loſs of Appetite, ſcorbutical Ulcerations, Cachexies, Dropſies, Jaundices, and the like.

Of Situations in a flat Country.

A Situation upon a Flat will be extreamly different in its Qualities, on Account of its being placed in a high or low Part of the Country, as it is pervious to different Winds, and the like; the Advantages and Inconveniences of which are already re-

recited. But this Inconvenience will certainly attend them, *viz.* A longer Continuance, and greater Quantity of ſtagnating Waters, whereby the Situation will be rendered more humid, than if placed upon a moderate Aſcent, and conſequently be more or leſs ſubject to the Diſeaſes attending a moiſt Diſpoſition of the Air, whether warm or cold, the Particulars of which being already enumerated, I ſhall refer the Reader to them.

Of a hollow or concave Country.

What has been ſaid of Situations in Valleys, may for the moſt Part be applied to a hollow Country, by which I mean one on all Sides encompaſſed with Hills, Rocks, and the like, ſo as to afford no free Courſe for the Wind, all which Places muſt neceſſarily be unhealthful on Account of the Stagnation of the Waters, the Cloſeneſs and Inactivity of the Air; from its being pent up, and not agitated by Winds; and the pernicious Vapours and Exhalations floating in it; which not being diſperſed, muſt there putrify, and become very injurious to the animal Oeconomy. How much the Uſe of freſh Air conduces to the Health and Well-being of an Animal, is evident from ſeveral of Mr. *Boyle*'s Experiments on Animals ſhut up in Air, clogged with Vapours and Exhalations (f), the Diving-Bell, the conſtant Inſalubrity of Camps, and the like; as alſo from Animals incloſed in artificial Air, which expire ſooner than *in Vacuo* (g). On which Account they will be ſubject to putrid, ma-

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(f) Pneumatical Experiments.

(g) Account of Animals in artificial Air.

lignant, and peſtilential Fevers, which in hot Summers will frequently attend them, as is evident from what has been ſaid already. This appears alſo from *Livy*'s Account of the Plague at *Rome*, during the Conſulſhip of *Valerius Potitus*, and *Manlius* (g), whoſe Situation is ſomewhat of this Kind, and expoſed to the warm and moiſt Winds (h), and eſpecially that of antient *Rome*, which ſtood much lower than the modern; the preſent City being built upon the Ruins of the former, and computed to ſtand about fourteen or fifteen Feet higher than the antient, taking one Part with another (i).

Nor do I think it at all diſſonant to Reaſon, that Diſeaſes of this Kind ſhould in theſe Situations, which are conſtantly moiſt and foggy, and filled with various Kinds of Vapours and Exhalations, happen chiefly in exceſſive dry, and hot Summers; ſince in *Africa*, as *Joan. Leo* reports (1), whoſe Clime is always hot and ſcorching, Showers falling during the hotteſt Months, commonly induce the Plague, and peſtilential Fevers, which Degree of Moiſture muſt in theſe Situations neceſſarily be found in the hotteſt Summers, and conſequently the Air of theſe Places, though ſituate in a much cooler Climate, come ſomewhat near to that made by the falling of Rains in *Africa*, during the hotteſt Months. Whence it is no wonder, if the Plague or peſtilential Fevers enſue. Agreeable to this is my Lord *Bacon*'s Opinion of the

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(g) *Tit. Livii.* Hiſt. *Roman.*

(h) *Baglivi Prax. Med.* lib. i. cap. 15.

(i) Mr. *Addiſon*'s Remarks on ſeveral Parts of *Italy*, p. 300.

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(1) Hiſt. *Afric.* lib. i. cap. 1.

Cauſe of the Plague in moiſt Airs, which he affirms frequently to happen in dry and hot Years (m). For the Sun Beams being reflected on all Sides, eſpecially in the hotteſt Parts of the Day, the Inhabitants of theſe Places are in ſome Meaſure placed in the Focus of a concave Speculum; by which Means not only the Heat will be much increaſed, but the Vapours exhaled in greater Quantities will there ſtagnate and putrify, through the Defect of Winds to diſperſe them, and thereby produce the moſt miſchievous Effects.

Of the Air & Plague of Ægypt.

NOR is it improbable that the Inſalubrity of the Air of *Ægypt*, whoſe Situation is low, and expoſed to the Sun's moſt ſcorching Beams, may be hence in a good Meaſure de-

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(m) Nat. Hiſt. Cent. IV. N° 383.

derived. The Air being not only filled with putrified Vapours, ariſing from the Mud and other Filth brought down by the preceeding Inundation of the *Nile*, (which is in ſuch Abundance, that as *Purchas* informs us (n), the very Soil is made up of it, the natural one of the Country, being only a dry unprofitable Sand) but the Inhabitants deprived of thoſe Breezes, which cool and abate the ſcorching Heat of the torrid Zone, and forced to build Towers to a conſiderable Height, to the Tops of which they aſcend for the Benefit of the Air.

Situation and Air of Grand Cairo.

But worſe ſtill than this is the Air of *Grand Cairo*, by the Situation of the City, " which lies cloſe under the Hill of the Caſtle, by " which all Wind and Air is inter-

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(n) *Purchas*'s Pilgrimage, lib. vi. cap. 17.

" tercepted, which cauſes ſuch a " ſtifling Heat there, as ingenders " many Diſeaſes (o):" And what ſtill adds to the Miſery of theſe People, is the Baſeneſs and Unwholeſomeneſs of the Waters they uſe for their conſtant Drink, there being very few Wells in the whole Country, and thoſe only fit for the meaneſt Uſes; ſo that the greateſt Part of their Drink is taken either out of the ſtanding Pools, or ſtagnating Sluices about the City, the River being no leſs than Half a League diſtant (p). To this Inſalubrity of the Air, the Exhalations ariſing from the ſtagnating Waters, in the numerous Gutters and Sluices cut from the River, may not a little contribute; which ſeems the more probable, ſince upon the Overflow of the River, by which theſe Sluices are cleanſed of their Filth, more wholeſome Vapours being ſent up, and a freſh Motion given to the ſtagnating Air, the Plague immediately ceaſes, inſomuch that as *Purchas* and others inform us, if there die at *Cairo* 500 of the Plague the Day before, yet upon this Increaſe of the River it intirely ceaſes, and none die of it (q). That this is owing to the Alterations induced in the Air from its new Motion, and the Effluvia of the Water (whether they be nitrous as Mr. *Boyle*, or of Cryſocolla as Dr. *Plot* imagines (r), or of whatſoever Species) is farther evident from that

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(o) *Thevenot*'s Travels, part I. pag. 128.

(p) *Purchas*'s Pilgrimage, or *Thevenot*'s Travels, Loc. Citat.

(q) *Purchas*'s Pilgrimage, lib. vi. cap. 7. *Sandy*'s Travels, lib. ii. p. 97. *Heylin*'s Coſmograph. pag. 925.

(r) Determ. Nat. of *Effluv.* cap. 4. Nat. Hiſt. of *Staffordſhire*, cap. 2. pag. 42.

violent Itching of the Skin, which conſtantly accompanies the Riſe of the River.

THAT the Plague and peſtilential Fevers do frequently take their Riſe from the Vapours exhaled from putrified and ſtagnating Waters, and other filthy Exhalations as Goals, Camps, the putrified Parts of Animals and Vegetables is ſufficiently atteſted by the beſt Writers (s); but how theſe are brought about in the animal Oeconomy, may be in a good Meaſure drawn from what has been ſaid already, eſpecially if joined with thoſe who have more particularly handled this Subject (t). What might farther be urged as an Argument that the Plague, ſo frequent in this Country, proceeds chiefly from theſe Cauſes, is the greater Salubrity of the neighbouring Countries; *Joan. Leo* (u) and *Purchas* (x) both inform us, that in *Numidia* it is not known once in an hundred Years, and not at all in the Land of *Negro*. But to return more particularly to our Purpoſe, beſides the above named Diſeaſes, the Inhabitants of a low, hollow, or concave Country, will be ſubject to Diarrhœa's, Dyſenteries, a cachectic and ſcorbutic Habit of the Body, Loſs of Appetite, flatulent, hypochondriac and melancholic Diſorders, Aſthma's,

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(s) *Diog. Laert.* lib. viii. ſegm. 70. *Aetii. Tetrab.* II. Serm. i. c. 94. *Stobæi de Sanitate*, Serm. xcix. *Oros.* lib. v. cap. 11. *Sennert.* lib. iv. cap. 14. & lib. ii. Part II. cap. 2. Ld. *Bacon*'s Nat. Hiſt. *Cent.* X. N° 914. *Boyle* of the Saltneſs of the Sea. *Bartholin. Act. Med.* Vol. IV. page 295. *Plot*'s Nat. Hiſt. of *Oxfordſhire*, cap. 2. pag. 10, 11. *Ramazini* de Morb. Artif. cap. 41, 42.

(t) *Bellini de Feb.* Prop. 18. *Mead* on Poiſons, Eſſay V.

(u) Hiſt. *Afric.*

(x) *Purchas*, lib. vi. cap. 13.

Conſumptions, Dropſies, Jaundices, Lethargies, Palſies and the like.

Of an open Situation.

By an open Situation, I mean one on all Sides expoſed to the Fury, and Inconveniences of the Winds and Weather: That no Place can be eſteemed healthful where the Air is pent up, and not ſufficiently agitated by Winds to preſerve it free from Stagnation, is I think evident from what has been ſaid already, yet in its oppoſite a Medium is to be obſerved, the Pleaſure as well as Salubrity of the Place, not depending on its being on all Sides naked and expoſed to the Weather, but chiefly on the convenient Poſition of Woods, Rocks, Hills, or other Shelter placed about it. The Diſadvantages of its being every Way expoſed to the Inclemencies of the Seaſons, whether in a hot or cold Climate, are ſo obvious from what hath been ſaid of the Effects of warm or cold Air on our Bodies, that it is needleſs to inſiſt upon them: Nor do I think many Directions neceſſary, after what has been ſaid of the general Qualities of Heat, Cold, the Difference of Winds, *&c.* This being laid down as a Rule, *viz.* That the more cold the Climate is, the greater Shelter will neceſſarily be required toward the cold Winds, and greater Opening toward the ſouthern, and warm ones, and *vice verſa*.

Of Woody Grounds.

THE moſt convenient, as well as ornamental Shelter is that of Wood, which ought to be cut through with Viſtoes, and made ſeveral Ways pervious to the Winds, whereby by the Vapours exhaled from the Trees, which would otherwiſe ſtagnate, and render the Air unwholeſome, will be diſperſed, and ſucceeded by a more dry, clear, and wholeſome Air. That Places abounding with Wood are thus moiſt and unhealthful, is evident from the Unhealthfulneſs of the firſt Colonies in *America*, which Effects abated as their Woods were cut down, and made more pervious to the Winds. This is farther evident from Dr. *Woodward*'s Experiments on Vegetation (y), by which it appears, that the Quantity of Water expended by ſome Plants, was to their Growth as above 700 to one, and that they would, one Day with another, in a ſhort Time, expend double their original Weight of Water.

(y) Philoſophical Tranſact. N° 253.

CHAP. IX.

Different Kinds of Soils.

THE different Kinds of Soils, excluſive of ſuch as contain ſome metallic or mineral Subſtances, though commonly divided into ſeveral Species, as common Mold, Sand, Clay, Gravel, Stone, Marſhy, Boggy, and the like, may be in a great Meaſure reduced, ſo far as relates to their healthful or noxious Qualities, which alone I ſhall conſider in this Place, to their being of a humid or drying Nature: Of the firſt Kind may be reckoned clay, boggy and marſhy Grounds; of the ſecond, ſandy, gravelly, and ſtony; the common black Mold being a Sort of Medium between them, and therefore preferred by ſeveral of the Antients, not only for the Profit accruing

Of Common Mold.

cruing to the Owner, but its ſalutiferous Qualities, as being free from ſeveral Inconveniences attending the reſt (z).

I am not ignorant how far ſhort this Diviſion comes of that vaſt Number of Earths reckoned up by the Writers *De Arte Combinatoria*; who, as *Kircher* informs us (a), reckon up no fewer than one Hundred and Seventy-nine Millions one Thouſand and Sixty-nine different Sorts of Earths. But of all this immenſe Number ſcarce eight or nine are ſo much as ſerviceable to the Huſbandman, and much leſs worthy to be enumerated in this Place, as being rarely, if ever found on the Surface, and I believe many of them ſcarce any where elſe, but in the Imaginations of the Authors themſelves.

(z) *Hippoc.* de Aerib. Aq. & Loc. *Aetii Tetrab.* I. Serm. iii. cap. 162. Ld. *Verulam*'s Nat. Hiſt.

(a) *Kircheri* Mund. Subterran.

Clay Ground.

The Effects of Clay Ground recorded by the Ancients, are its weakening the Tone of the Stomach and Viſcera, palling the Appetite, relaxing the Fibres of the Body, and debilitating the whole animal Oeconomy (b): All which are brought about by its cold, viſcous, and unactive Nature, not only retaining the Moiſture it receives by Rains, Dews, or otherwiſe, a longer Time, but yielding faint and unpleaſant Vapours. And what contributes no ſmall Share to the producing thoſe Effects, is the flat and low Poſition of moſt clay Grounds, whereby the Waters are apt to ſtay too long upon them, and produce all the Conſequents of a humid Situation.

(b) *Aetii* & *Stobæi*, loc. citat.

Marſhy and boggy Grounds. BUT much worſe ſtill than theſe, are the Effects conſequent on marſhy and boggy Grounds, from the vaſt Quantity of filthy Vapours and Exhalations produced by the diſagreeable Mixture of Salts and Sulphurs lodged in the corrupted Earth, ſtagnating Waters, and putrified Parts of vegetable Subſtances: *Ramazini* and *Kircher* both inform us (c), that the Fumes ariſing from ſtagnating Waters, wherein Hemp was ſteeped, (which indeed are very ungrateful to the Senſes, and that to a much greater Degree in hot Climates than this) brought on malignant and peſtilential Fevers. Nor do there want almoſt innumerable In-

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(c) *Ramazini de Morb. Artificum*, cap. 4. *Kircheri Scrutin. Peſtis*, Sa. 1. Sect. 1.

Inſtances of the like Effects produced from the Effluvia of theſe Grounds, ſeveral Inſtances of which being already given (d), I ſhall not multiply Citations.

ANOTHER Inconvenience attending theſe Situations is, the vaſt Quantity of Flies and Inſects generated in theſe Places, which not only corrupt and defile the Waters, and Product of the Earth, but are ſome of them as *Varro* informs us (e), of ſuch exceeding Smalneſs, as to float inviſibly in the Air, and be ſucked in at the very Noſtrils, whence ſays he proceed great and obſtinate Diſeaſes. Whether this be really ſo or not, I ſhall not diſpute, but the frequent cutaneous Eruptions in theſe Places, many of which contain Worms of ex-

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(d) Cap. 8.

(e) *M. Terent. Varron.* de Re Ruſtica, lib. i. cap. 12.

ceeding Smalneſs, render it not altogether improbable. However the numerous Eggs of theſe, and other Inſects and Reptiles ſwarming in boggy Grounds, muſt frequently be latent in their Foods and Drinks, which if not ſufficiently broke by the Force of the Stomach, as in thoſe whoſe Digeſtions are weak they frequently will not, muſt thence paſs farther into the Body, where meeting with a proper Nidus, various Animalcules will be generated, which getting into the ſmall capillary Veſſels will there cauſe Obſtructions, Inflammations, Fevers, and the like; as appears from the numerous Worms and Maggots found in ſome Tumours and Ulcers, ſixty of which were at one Dreſſing taken out of the Ancle of a Girl at *York*, and thoſe as Dr. *Liſter* informs us, of three or four Inches long (f). This is farther evident from the Worm-Fevers ſo frequently happening to Children and young Perſons, the Fibres of whoſe Stomachs are weak, and leſs able to break the Tunicks of theſe Eggs, than thoſe of adult ones. To which may be added the long Worms coming out of the Fleſh in the *Eaſt-Indies*, occaſioned by the Water between *Gomroon* and *Schiraz*, eſpecially about *Laur*, and that ſometimes to the Length of ſix or ſeven Yards (g).

I ſhall not need particularly to deduce the Inconveniences conſequent on the Humidity of the Air, having already done it; to all which the

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(f) Philoſoph. Tranſact. N° 95. pag. 60, 64. See alſo Memoirs of *M. de La Croſs*, for the Month *July*, *Anno* 1693. and Philoſoph. Tranſact. N° 213. pag. 215, and 222.

(g) Philoſoph. Tranſact. N° 225. pag. 417.

Inhabitants of theſe Places muſt be extreamly ſubject, and the more eſpecially if they be ſituate in a hollow Country, whereby they are deprived of the Benefit of the Winds, which joined with the forementioned Inconveniences, renders a Situation of this Kind, compleatly Unhealthful.

The beſt Method I know to prevent the Inconveniences attending theſe Situations, is that recommended for an humid Air, whether warm or cold according to the Climate, except that recited by *Varro*, which is to leave the Place, though to a conſiderable Diſadvantage (h).

Sandy and gravelly Grounds.

As the former Situations are diſcommended by all Writers, ſo are thoſe of the ſandy and gravelly Kind approved of by moſt, for their ſalutiferous Qualities; the Soil being dry, and ſending up no unhealthful Vapours, the Air clear, and the Country commonly ſufficiently elevated, above the neighbouring Grounds. *Cato* indeed (i) and *Columella* (k) both commend a rich and fruitful Soil, which will by no Means ſuit with this Situation, but they deſcribe a meer Farm, and conſult not ſo much the Health as Profit of the Inhabitants, as is evident from the Character of the former recorded by *Plutarch* (l). For it will frequently happen, that ſuch Soils, by Reaſon of a great Quantity of Tillage and forced

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(h) *Vendas quot Aſſibus poſſis, & ſi nequeas relinquas. M. Ter. Varron.* de Re Ruſtica, lib. i. cap. 12.

(i) *M. Por. Caton.* de Re Ruſtica, lib. i. cap. 2.

(k) *Columellæ* de Re Ruſtica, lib. i. cap. 2.

(l) *Plutarch*'s Life of *Marcus Porcius Cato.*

Earth, will yield a very unwholeſome Air; an Inſtance of which we have in the Soil of *Ægypt*, which (as I ſaid before) is made up of the Mud and other Filth brought down by the River, and withal ſo exceeding fertile, as to be reputed the Granary of the *Roman* Empire, and that judged by *Pliny* impoſſible to continue in its Grandeur, without a Supply of Corn from *Ægypt*.

THE greateſt Inconvenience attending a ſandy or gravelly Situation, is the too ſtrong Reflection of the Rays of the Sun, eſpecially in hot and ſultry Countries; whereby the Sight and Eyes are weakened, and the Body dried and emaciated, as appears by their Effects in ſome ſcorching Parts of *Africa*. This is farther evident from what *Ramazini* has obſerved of Smiths, and ſuch as are much converſant about the

Fire, moſt of whom are ſubject to blear and ſore Eyes (m). How ſtrongly thoſe Soils do reflect the Rays of Light, our Eyes eſpecially if tender, will eaſily inform us; and Mr. *Boyle* tells us of a Bed of Sand on the Side of Mount *Teneriff*, which was ſo heated by the Reflection of the Sun-Beams from the Rocks above, that it burnt the Feet of a Dog as he paſſed over it, though in every Part elſe of the Mountain, themſelves and Horſes were aguiſh, and extreamly chill, and even their Wines and ſtrong Liquors, through the Severity of the Cold, ſeemed to have loſt their Force (n).

Stony Ground.

WHAT has been ſaid of a gravelly and ſandy Soil, may for the moſt Part be applied to a rocky and ſtony Situation,

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(m) *De Morb. Artif.* cap. 11.

(n) Account of Mount *Teneriff.*

Situation, with this Difference, that the greater Cloſeneſs and Solidity of their Parts, render them more cold and chilling in Winter, and the Reflection from them ſtronger in the Summer Heats. And the more eſpecially, if they be ſituate in ſuch Manner, as to reflect the Rays of the Sun in the hotteſt Parts of the Day, in which Caſe the Inhabitants will be ſcorched as it were by two Suns at once; as well as ſubject to ſudden Alterations of the Air's Temperature from the Coldneſs of the Mornings and Evenings, both which will prove highly prejudicial. But the moſt remarkable Inſtance of this Kind is the Iſle of *Ormus*, which from the ſtrong Reflection of the Sun-Beams by the numerous ſalt Rocks contained in it, ſeems at a Diſtance to be all Fire, and is withal ſo exceeding ſcorching that its Inhabitants are obliged to ſit Chin-deep in Water all the Heat of the Day, even in its cooleſt Parts, whilſt others, where the Rays are more concentered, are perfectly uninhabitable by any Creature whatſoever, and ſo entirely burnt up, that no Vegetable of any Kind is to be found therein.

Situations near Mines.

How much the Fumes of metallic and mineral Bodies affect the animal Oeconomy, is evident from their Effects on Animals ſhut up in artificial Air, which expire ſooner in that produced from moſt mineral and vegetable Subſtances; as alſo from the Effects of the moſt celebrated Mephites, *viz.* The *Grotto di Cani, &c.* to which may be added their Influence on thoſe who are daily converſant with them, not only Miners who work, and are pent up the greateſt Part of their Lives in deep and cloſe Mines, where the very Stagnation of the Air, Moiſture of the Place, and Fumes of metallic and mineral Bodies neceſſarily prove highly injurious, but likewiſe on thoſe who are buſied in cleanſing and dreſſing Ores and mineral Subſtances, even in the open Air, who as *Ramazini* and others inform us, are Cachectick, Aſthmatick, Paralytick, *&c.* (o). Which Effects very much vary according to the Nature and Qualities of the particular metallic or mineral Bodies. Thus *Lead* is ſaid to induce Cholicks and Palſies (p);

(o) *Morb. Artif.* cap. I. pag. 11, & 23. *Hippoc.* Epidem. iv. 13. *Wedelii. Patholog. Dogmat.* Sect. ii. cap. 9. *L. Tozzii Prax. Med.* Part. II. *Cap. de Aſthmate. Helmontii Tract. de Aſthmate.*

(p) *Ramazini de Morb. Artif.* cap. iv, & v. *Wainwright*'s Non-naturals. pag. 82. Philoſoph. Tranſact. N° 2. pag. 6.

Mercury, Tremors, Vertigoes, Palſies, Hecticks (q); *Alum*, *Vitriol*, *Iron*, and others by their Stypticity, produce Coſtiveneſs, Rigidity of the Fibres, Obſtructions, Incubus, aſthmatic, hypochondriac, and melancholic Diſorders (r); *Arſenic*, *Marchaſites*, and other pungent and acrid Salts, Ulcers, cutaneous Eruptions, Baldneſs, Botches, Inflammations, Cardialgia, Cholics, Epilepſies, and the like (s); Fumes of *Coal*, *Sulpher* and *bituminous* Bodies, Suffocations, Aſthma's, Flatus, Tormina Hy-

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(q) Fallopii *Tract. de Metal. & Foſſit.* *Ramazini de Morb.* cap. i. Non-nat. Loc. Citat. *Schenckij* Obſ. Med. lib. vii. Obſ. 196, 197, 198.

(r) *Baglivi Prax. Med.* lib. i. cap. 15. Non-nat. Loc. Citat.

(s) *Mead* on Poiſons, Eſſay iii. 116, *&c.* Philoſoph. Tranſact. N° 2. p. 6.

Hypochondriaca, *&c.* (t). All which Effects will be more or leſs virulent, as the Vapour ariſing from theſe mineral Subſtances, is more or leſs ſtocked with their Particles, and as they are ſituated in a high, low, open, or cloſe Place, whereby the Fumes and Exhalations will be either diſperſed, and rendered ineffectual by Winds, and a conſtant Supply of freſh Air, or be there collected in great Quantities, and produce the moſt grievous Effects.

Of Grotto's Vulcano's &c.

HENCE we may account for the Miſchiefs produced by the Fumes and Exhalations of Grotto's, Vulcano's, *&c.* ariſing either from ſuch Mixtures of the Salts and Sulphurs of metallic and mineral Bodies as deſtroy the Air's Elaſticity, augment its Gravity, and render it unfit for Reſpiration, and the animal Uſe; of which Kind the *Grotto di Cani* in *Italy* is, and the Lake *Avernus*, and others are ſaid to be (u): Or from the Smoak, Aſhes, and the like, ſent by them into the neighbouring Country, which filling the Air with Duſt, Fumes, and Exhalations, render it unfit for Reſpiration, and produce Suffocations, Aſthma's, Syncope's, *&c.*

(t) *Plinii* Nat. Hiſt. lib. xxxi. cap. 3. Philoſoph. Tranſact. N° 3. p. 41. N° 48. N° 117. p. 392. N° 136. p. 895.

Air of Cities and Towns.

BUT before I leave this Subject, it may not be amiſs to take Notice of the Difference of the Air of Cities and large Towns, from that of the Country adjacent; the former being always more ſtocked with heterogeneous Effluvia ariſing from the Smoak, Steams of common Shores, and Exhalations of animal Bodies, and the like unwholeſome Vapours, which clogging the Air's Spring, render it leſs fit for Reſpiration, and the animal Uſe. Whence the Inhabitants of ſuch Places will be more ſubject to the forementioned Diſeaſes attending an Air of this Kind, than thoſe who live in the purer Air of the Country (x). And eſpecially if ſome great and remarkable Trade or Manufacture be carried on in it, as are thoſe of Cloth, Iron, *&c.* ſuch Places being not only more populous; but the Air filled with a greater Quantity of Fumes and Exhalations, ariſing partly from the Subſtances themſelves, and Ingredients uſed in manufacturing and preparing them; and partly from the large Fires, Furnaces, *&c.* neceſſary on ſuch Occaſions.

(u) *Bernadi Connor.* Lib. *de Antris Lethiferis. Mead* on Poiſons, Eſſay v.

(x) *Baglivi Prax. Med.* lib. i. cap. 15. *Sanctorii Med. Static.* Sect. 2. Aph. 61. *Ramazini de Morb. Artif. Wainwright*'s Non-nat. pag. 89.

Situations near Lakes, &c.

IT will be needleſs to enumerate the Inconveniences attending a Situation immediately adjoining to large Lakes, Rivers, *&c.* it being ſufficiently evident, that theſe Places muſt be more moiſt and foggy, than is conſiſtent with a healthful Situation. But in theſe there will be no ſmall Difference in their Effects, as they either entirely ſtagnate, or paſs off in a ſlow or rapid Current; the firſt being by all exploded, and the laſt for many Reaſons moſt eligible.

CHAP. X.

Of Waters. AS there is nothing enters the Body in greater Quantity, or more frequently than Water, this being the Foundation of all our Drinks, whether natural or Artificial, as well as principal Ingredient in various Kinds of Foods, and ſole Vehicle of all our Nouriſhment, not to mention its Uſe in cooking and preparing them; ſo are the Alterations produced thereby in the animal Oeconomy, of the utmoſt Conſequence, an Error herein proving often the Cauſe of fatal Miſchiefs, and moſt obſtinate Diſeaſes. What was ſaid before of the Origin of different Qualities in the Air, may be equally applied to this Fluid, which is in itſelf ſimple and homogeneous, friendly to our Natures, and excellently adapted to relieve innumerable Neceſſities, of both the animal and vegetable Kingdom. For, as that by paſſing over various Climates, Tracts of Earth and Water, acquires new and even contrary Qualities, ſo does this no leſs, from the various Kinds of Salts, Sulphurs, metallic, and mineral Particles it meets with in the Bowels of the Earth. Nor is it only altered by theſe Means, but alſo by its Heat and Coldneſs, Motion and Stagnation, Congelation, and the like.

Difference of Waters, whence.

It would be endleſs, as well as unneceſſary, to enumerate all the different Qualities, ariſing from the various Mixtures of Salts, Sulphurs, &c. in the Veins of the Earth; I ſhall therefore account for ſome of the moſt notorious, which are applied to conſtant Uſe, excluſive of ſuch, as are ſo highly impregnated, as to become medicinal, theſe not at all coming under the Deſign of this Treatiſe.

Waters may be conſidered as they contain any metallic or mineral Subſtance, as Gold, Silver, Iron, Copper, Tin, Lead, Mercury, Arſenic, Alum, Vitriol, common Salt, Sulphur, Nitre, *&c.* Secondly, from the Soil through which they paſs, as Sand, Gravel, Sand, Clay, Mud. Thirdly, from their Motion or Stagnation, and Impregnation with animal and vegetable Subſtances. Fourthly, from their Congelation, Warmth or Coldneſs and Poſition, with Reſpect to the Sun and Winds.

Mineral Waters.

Of theſe, the former are undoubtedly hurtful to moſt Conſtitutions, on Account either of their greater Weight, and more difficult Paſſage by Urine and Perſpiration; the Acrimony of their Particles, by which the Veſſels are torn and corroded in their Paſſage; or from their ſtrong contracting and drying Quality, by which the Solids are hardened, and become rigid and inflexible, the Fluids rendered acrid and pungent, and apt to ſtop in the capillary Veſſels. For, theſe Particles being too hard and ſolid to be broke by the Force of the Veſſels, and circulating Liquors, and withal angular, ſharp, and pungent; will not only in their Paſſage, through the ſmall and nervous Veſſels, wound and tear their Coats, but frequently by the Ruggedneſs and Inequality of their Surfaces, obſtruct the Canals, and render them impaſſable, and eſpecially when the Veſſels are become hard and rigid, by a long Uſe of theſe contracting Waters; whereby the Canals are ſtraitened, and the Fibres through their greater Stiffneſs, leſs apt to yield and give Way to the obſtructing Matter. Whence proceed Obſtructions, Inflammations, Aſthma's, Pleuriſies, Peripneumonia's, Coſtiveneſs, dry Gripes, Strangury, Stone, ſcorbutic and arthritic Pains, and the like (z). Which will moſtly happen to ſuch, as are of a hot, tenſe, and cholerick Conſtitution, whoſe Fibres are already too ſtiff and rigid: On the contrary they may be of no ſmall

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(z) *Hippoc.* de *Aer.* & *Aq.* *Oribaſ. Collect.* lib. v. *Aetii Tetrab.* I. Serm. III. cap. 165. *Avicen.* Tract. v. *Lib. de removendis a Sanitate nocumentis.*

Service to ſuch, as are of a lax and phlegmatic Habit of Body; the Vibrations of the Fibres which are naturally too weak and ſlow, being rendered more denſe and ſtrong, and the groſs and viſcid Fluids attenuated by their active Salts.

Waters paſſing through a ſandy Soil.

Of the ſecond Species, thoſe paſſing through Sand or Gravel, are eſteemed preferable to the reſt, the heterogeneous Particles being ſtopt in their Paſſage, by the conſtant Percolation; on which Accounts, theſe Waters are commonly light, clear, ſmooth, and inſipid (a), and conſequently more generally uſeful to the animal Oeconomy than the reſt, as capable of receiving the moſt advantageous Qualities.

(a) *Vitruv*. cap. i. lib. 8. Architect. *Plinii* Hiſt. Nat. lib. xxxi. cap. 3.

Through Stone.

THOSE paſſing through Stone, though commonly clear and bright, are generally leſs ſmooth and free from heterogeneous Salts, than the laſt mentioned, and ſometimes ſtocked to that Degree, as on this Account to render them unwholeſome, through their ſtrong contracting and drying Quality (b). To which may be added the petrifying Quality of many of theſe Waters, whereby not only the *primæ Viæ*, and Paſſage of the Chyle will be obſtructed, (a remarkable Inſtance of which we have given by *Nicholas de Blegny*, in one who was diſſected at *Paris*, where the *Pilorus*, a great Part of the *Duodenum*, and Stomach itſelf were incruſtated with a ſtony Matter, to the Thickneſs of a Finger's Breadth (c), but the ſmall Veſſels will be obſtructed, and Stones formed in various Parts of the Body, and eſpecially in thoſe deſigned for carrying off the more ſerous and aqueous Parts of the Blood, as are the urinary Paſſages. For notwithſtanding theſe Particles, when carried along with the Chyle, may be ſmall enough to circulate with the Blood, without any manifeſt Diſturbance from them; yet, they will when encreaſed in Number, partly by their own ſtrong attractive Force, and partly by their Union with ſome viſcous Fluids, form larger Coheſions, obſtruct the Paſſage of the circulating Fluids, and produce ſuch Concretions, as are by no Means conſiſtent with an healthful State. To this agrees the Ob-

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(b) *Hippoc.* de *Aer.* & *Aq. Act. Tetr.* III. Serm. III. cap. 9. & *Tetr.* I. Ser. iii. cap. 165. *Stobæi* Loc. Citat.

(c) *Zodiac. Med. Gallic.* Anno 1679. *Menſ. Feb.* Obſ. 3.

Obſervation of Dr. *Liſter*, who acquaints us that the Inhabitants of *Paris*, are more frequently afflicted with the Stone than moſt other Places, occaſioned by the Hardneſs and great Quantity of ſtony Particles in the Water of the River *Seine*, which is ſo ſtocked with them, as to incruſtate, and often ſtop up the Pipes, through which it is conveyed into the City (d). Of theſe Waters, thoſe paſſing through the red, ſandy and gravelly Stone, are eſteemed preferable to the reſt, as containing fewer Salts, and coming neareſt to the former already mentioned.

Through Clay.

As to clay Grounds, there are I believe few or no Springs, which paſs through a ſolid Bed of Clay, the Waters found in ſuch Places, commonly paſſing through a *Stratum*

(d) Voyage to *Paris*.

tum of Sand or Gravel lodged in the Clay, on which Account it is, that the Antients obſerved the Springs found in clay Grounds to be commonly very good, but rare and difficult to be met with (e).

Through Mud.

Those paſſing through Mud are condemned by all, being conſtantly largely ſtocked with pungent alcalious Salts and Sulphurs, extracted in their Paſſage, occaſioned chiefly by the Putrifaction of vegetable Subſtances in them, moſt, if not all of which, do hereby acquire an acrid and alcalious Diſpoſition; and conſequently of a hot, acrid, and pungent Nature, apt to putrify and ſtink in a ſhort Time, and highly injurious to the animal Oeconomy (f).

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(e) *Plinii* Hiſt. Nat. lib. xxxi. cap. 3.

(f) *Galeni Com. in Part.* X. *Sect. Lib.* 6. *Epidem.* Hippoc. Plinii Loc. Citat. Stobæi Loc. Citat. Aetii *Tetrab.* I. Serm. iii. cap. 165. Actuar. *de. Sp. Anim. Nutr.* cap. viii.

Of Running Waters.

The Antients, among the admirable Rules delivered by them for the Choice of Water, frequently inculcate its Similitude to Air; partly on Account of the greater Lightneſs and Purity of the fineſt Waters, and partly on Account of the Changes wrought in them both by their Stagnation, and Mixture with heterogeneous Particles. And indeed, as there is nothing contributes more to render the Air pure and wholeſome, than its Agitation by Winds and gentle Breezes; ſo neither does any thing preſerve Water from corrupting, and acquiring the moſt miſchievous Qualities, ſo well, as a briſk and rapid Motion, which is ſo eſſentially neceſſary to this End, as to be conſtantly enumerated amongſt the diſtinguiſhing Characters of a wholeſome

ſome Water (g). The heterogeneous Particles, being either ſtopt by its Percolation dropt in its Paſſage, or at leaſt deprived of that Fermentation and Putrifaction, which would otherwiſe neceſſarily enſue, and render them leſs fit for the animal Uſe.

Of ſtagnating Waters.

The Miſchiefs ariſing from the conſtant Uſe of ſtagnating and putrified Waters, may be juſtly eſteemed ſome of the moſt deplorable and obſtinate that afflict Mankind. For not only the Texture of the ſanguineous Globules will be too much broken and divided by the acrid Salts and Sulphurs lodged in theſe

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(g) Hippoc. *de Aer. & Aq.* Cardani *Comment. in hunc Lib.* Plinii *Nat. Hiſt.* lib. xxxi. cap. 3. *Aetii Tetrab.* Loc. Citat. *Actuarii* Loc. Citat. *Vitruv.* lib. viii. cap. 5. *Architect.* Avicenna, lib. i. Fen. 2. Doct. 2. cap. 16.

Waters, but its more groſs and terreſtrial Parts, (which will be much augmented by their Uſe) will be incraſſated, united, and retained in the Body, and thence apt to ſtagnate in the capillary Veſſels. The Serum alſo being rendered acrid and corroſive, muſt neceſſarily prick and tear the Coats of the Veſſels, and eſpecially when its Paſſage is intercepted by the more groſs and tenacious Fluids, and its Salts ſharpened by the Heat of the Body. Whence proceed Itchings, cutaneous Eruptions, a ſcorbutical Diſpoſition, phagedenic Ulcers, Heat, Thirſt, arthritic and rheumatic Pains, Obſtructions and Hardneſs of the Viſcera, Jaundices, ſchirrhus and cancerous Tumours, Diarrhœa's, Dyſenteries, lingering and malignant Fevers, Quartans, Hecticks, Conſumptions, a thin and meagre Habit of Body, Flatus, hypochondriac Complaints, Melancholy, Madneſs, and the like (h). And the Viſcoſity of the Fluids conſtantly increaſing, and the Quantity of animal Spirits decreaſing, Perſpiration will be intercepted, the Veſſels loaded with a ſharp and corroſive Serum (i), and a Dropſy enſue, the almoſt conſtant Harbinger of Death in theſe Conſtitutions, as the great *Hippocrates* has long ſince obſerved. All which will be farther promoted, by the unequal Diſpoſition of theſe Waters, as to their Heat and Coldneſs in the different Seaſons of the Year, being in Winter commonly frozen, and conſequently much colder than quick and running Springs; and in Summer warm, thick, ſtinking and putrid.

(h) Aetii, Actuarii & Plinii Loc. Citat. *Sanctorii Med. Static.* Sect. 2. Aph. 6. *Mead* on Poiſons, Eſſay V. *J. H. Scelera Aquarum.*

(i) *Sanctorii*, Loc. Citat.

To theſe may be added a long Train of Maladies, ſpringing from the numerous Eggs and Spawn of filthy Inſects and Reptiles lodged, and hatched in theſe Waters; which not only increaſe the *Fœtor* and Corruption of them, but by being carried into the Body, by their Means prove often of moſt fatal Conſequence. For not to mention the different Kinds of Worms bred in the Bowels, Reins, Heart, Brain, and other Parts of the Bodies of Men, and other Animals, occaſioned frequently by the Uſe of theſe Waters, Inſtances of which are almoſt innumerable; nay, ſometimes crawling alive out of the very Veins upon bleeding (k); even Snakes,

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(k) Miſcellan. *Gallic.* Edit. *per* N. de Blegny *Anno* 1679. *Menſe* Maii *Obſ.* 7. *Menſe* Auguſt. *Obſ.* 7. *Menſe* Decemb. *Obſ.* 7.

Toads, Lizards, and others of the moſt filthy Animals, have been frequently bred in the Body by their Means.

GESNER tells us, that in and about *Ziſca* a Town in *Hungary*, near three thouſand People died *Anno Dom.* 1551, of violent Pains in the Stomach and Bowels, occaſioned by Serpents and Lizards, generated within them, which would ſometimes as theſe miſerable People lay down in the Sun, appear at their Mouths (l). *Bartholine* aſſures us, that a Woman who died at the Hoſpital at *Altenburg*, voided by Stool and Vomit, for twenty Years together, many Toads and Lizards, and much filthy Matter like their Spawn; the Truth of which Relation is alſo confirmed by *Wolgnad*, cited by *Bonetus* (m), and in the *German* Tranſactions (n). Another Relation not much unlike this, may be found in theſe Tranſactions of a Butcher's Boy, who in the Spring drank greedily of ſome ſtanding Water, which ſome Time after cauſed great Pains in his Stomach, accompanied with the moſt violent Symptoms, which ceaſed not till he had vomited up three live Toads (o). To which may be added that Relation of Dr. *Sorbait*, which he affirms to have ſeen himſelf, of one who had a Toad brought forth from an Abſceſs, occaſioned by the drinking of foul Water (p). *Nicholas de Blegny*

(l) *Geſneri* Hiſt. Animal. lib. ii. *Cap. de Lacertis*,

(m) Boneti *Sepulchret. Anatom.* lib. iii. Sect. 17.

(n) Ephemer. *German.* Tom. I. Obſ. 103.

(o) *Ibid.* Tom. II.

(p) Ephem. *German.* Tom II. Obſ. 103.

Blegny likewiſe tells us of a Monk who, *Anno* 1677, with incredible Torment voided a Serpent by Urine of above a Span long (q). But we need not ramble thus far from Home for Inſtances of this Kind, ſeveral of which may be found in our own philoſophical Tranſactions (r).

Nor are the Effects occaſioned by the putrified Parts of vegetable Subſtances, floating in theſe Waters, of leſs pernicious Conſequence; a remarkable Inſtance of which is that given by *Schenckius*, of ſome who died by drinking Water wherein Hemp was ſteeped (s), and cites *Abenzoar*,

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(q) *Zodiac.* Med. Gallic. *Anno* 1679. *Menſe* Apr. *Obſ.* 2.

(r) Philoſoph. Tranſact. N° 117. pag. 393. & 394. N° 6. p. 164.

(s) *Schenckii* Obſ. Med. lib. viii. Obſ. 8.

Abenzoar, who was in ſome Danger by drinking the Waters of a Well wherein ſome Lizards were putrified (t). But it would be endleſs, as well as tireſome to the Reader, to enumerate all the fatal Effects of theſe Waters, ſo I ſhall not trouble him with more Citations; what has been ſaid, being, I believe, ſufficient to convince any Perſon of their dangerous and pernicious Qualities.

Of Well-Water.

Nor are the Waters of the greateſt Part of our Wells, in uſe for common Drink, altogether inculpable on Account of their Stagnation, Cloſeneſs, and Mixture with metallic and mineral Ingredients, though not to that Degree as the ſtinking and putrid Pools abovementioned. Whence they will gradually diſpoſe the Body to the forementioned Diſeaſes,

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(t) *Ibid.* Obſ. 8.

eaſes, and ſooner or later make us ſenſible of their fatal Effects (u).

Rain Water.

Rain Water though in itſelf lighter than others, and on that Account eligible, is yet from the Heterogeneity of its Parts, owing to the Exhalations of Plants and Animals, the Steams of common Shores, Bogs, Fens, and the like, apt to putrify in the ſhorteſt Time of any other, and conſequently leſs wholeſome than that of quick and living Springs; and eſpecially if long kept, the ſaline and ſulphureous Parts being attenuated, and rendered acrid and pungent; ſo that ſuch who are obliged to uſe it as their Drink, or otherwiſe in Foods, ought principally to take Care it be kept as ſhort a

Time

(u) J. H. *Scelera Aquarum.* *Mead* on Poiſons, Eſſay V.

Time as poſſible, or elſe ſtay till its Fermentation be over, and it acquire its priſtine Purity.

The Antients, whoſe chief Drink was Water, lay great Streſs on its Warmth or Coldneſs, and Poſition with Reſpect to the Sun and Winds; thoſe reſpecting the Eaſt being, *cæteris paribus*, moſt eſteemed, as having the Benefit of the Morning Sun to correct their Coldneſs and Crudity, and being ſheltered from the ſcorching Heat of the reſt of the Day; whereas thoſe towards the South in Summer were eſteemed too warm, and apt to putrify from the greater Heat, and thoſe reſpecting the North and North-Weſt, through their exceſſive Coldneſs, eſpecially in Winter, thought of no leſs ill Conſequence, from their too ſuddenly conſtringing the Fibres, ſtraitening the Canals, condenſing the Fluids, chilling the Stomach, and hindering Concoction. Whence proceed Obſtructions in the Viſcera, Colicks, Cachexies, Hardneſs of the Belly, Stone, Strangury, Flatus Hypochondriacus, Coughs, Aſthma's, Angina's, Obſtructions and Inflammations of the Breaſt and Lungs, and the like (x).

Waters produced by the melting of Snow, Ice, &c.

The Waters produced by the melting of Snow, Hail, Ice, and the like, are reputed of no leſs ill Conſequence; the lighteſt and beſt Part of the Water being evaporated during the Diſſolution, and the groſs, ſaline, and terreſtrial only remaining.

(x) *Hippoc.* de *Humidor. Uſu, de Aer. & Aq. Epidem.* VI. *Sect.* 3. *Aetii Tetrab.* III. Serm. III. cap. 9. *Actuar.* de *Sp. Anim. Nutr.* cap. viii. *Theoph. Bonet. Anatom. Pract.* lib. ii. Sect. 1. Obſ. 73.

ing. Whence it is, that they who are forced to make uſe of theſe as their conſtant Drink, are obſerved to be much troubled with the Stone, Gravel, Strangury, arthritic Pains, Colicks, Dyſenteries, Angina's, and ſuch like (y). To which may be added the chilling Coldneſs of theſe Waters, which frequent Experience may convince us to be attended with the moſt pernicious Conſequences (z).

Whence probably it may be, as well as from the Cauſe abovementioned, that the Waters produced by the melting of Snow on the *Alps*, are ſo apt to obſtruct and ſwell the

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(y) *Mar. Donat.* lib. iii. cap. 6. *Hiſt. Med. Admirab. Mead* on Poiſons, Eſſay V.

(z) *Hippoc.* de *Aer.* & *Aq. Aph.* Sect. v. Aph. 24. *Schenckii*, lib. 7. Obſ. 2. *Fab. Hildan.* Obſ. *Chirurg.* Cent. 4. Obſ. 43. *Boneti Sepulchret. Anatom.* lib. ii. Sect. 1. Obſ. 73.

Glands of the Throat, ſo that as Dr. *Mead* obſerves, very few of them are exempted from this Inconvenience (a).

Character of the beſt Water.

From what has been ſaid, it will follow, that the beſt Water is ſuch as is leaſt impregnated with heterogeneous Particles, and flows from quick and conſtant Springs, and thoſe riſing out of a gravelly, ſandy, or earthy Bottom; as alſo which is moſt light, clear, inodorous, and inſipid; to which may be added its eaſy Lathering with Soap, ſmall Refracting of the Rays of Light, ſpeedy Boiling and Cooling, and its ſupporting the leaſt Weight.

(a) Loc. Citat.

CHAP. XI.

Of Diet. THE Subſtances taken as Diet, may be reduced to ſuch as belong to either the vegetable or animal Kingdom; of the former, *Of Bread and farinaceous Preparations.* Bread is the moſt nouriſhing, and eſpecially that of Wheat, when thoroughly cleared of the Bran; which ought to be light and well fermented, whereby its viſcous Parts are broken and divided, require leſs Force to reduce them into a chylous Liquor, and conſequently are much eaſier digeſted by the Stomach, than thoſe of a more groſs and viſcous Texture. For Digeſtion being nothing elſe but the Separation of the Parts of our Food and their Reduction into a fluid Subſtance, a conſiderable Part of this Work is already done by Fermentation, which conſiſts only in the breaking and dividing of its conſtituent Parts by their inteſtine Motion. Bread thus prepared, will neceſſarily require leſs Force to reduce it to a due Fluxility. For the ſame Reaſon it is, that it ought to be well-baked, and not eaten too new, as the preſent Mode too much requires.

The greateſt Inconvenience attending the Uſe of the fineſt Wheat-Bread, is its being too apt to render the Body Coſtive in ſome Conſtitutions, which may be prevented by a ſmall Portion of Rye or Bran mixed with it.

The other Grains in moſt Uſe amongſt us are Rye, Barley, and Oats, all which with due Preparation and Fermentation may be reduced to good Food. And indeed it is the compleat Fermentation, as much as the Texture of the Grain itſelf, which renders theſe Subſtances more or leſs digeſtible by the Stomach, as is evident in wheaten Bread, which few Stomachs are able to digeſt without a previous Fermentation. And it is for this Reaſon, as well as their viſcous Texture, that the Bread of Beans, Peaſe, and the like groſs and glutinous Subſtances, which is ſeldom fermented, being in Uſe only amongſt the meaneſt People, is windy and hard to be digeſted, and apt to offend the Head and Stomach of ſuch as are not accuſtomed to it, or uſe not ſo much Exerciſe as is ſufficient to attenuate its viſcous Coheſions. Which Inconvenience, though more appropriated to theſe than any other Grain from their greater Viſcoſity, is yet a conſtant Attendant on the reſt, and indeed on all farinaceous Subſtances, where a due Fermentation is wanting; and might I doubt not in theſe, as well as others, be much mitigated, if not entirely taken away, by a more compleat Fermentation, in Proportion to their greater Viſcoſity, if they who uſe them would be at the Charge or Trouble of it.

INDEED it is from this Source chiefly, that the Miſchiefs attending the Uſe of all crude and farinaceous Subſtances take their Riſe; for theſe viſcous and unactive Particles, uniting with the Mucus of the Stomach, form a tough and glutinous Maſs, hardly digeſtible by the ſtrongeſt Stomach. This viſcous Subſtance will neceſſarily require a greater Force in the Organs deſtined to Digeſtion, the Bile, and *Succus Pancreaticus* to reduce it to that Fluxility, *Of the Bile.*

Fluxility, which is requiſite to a healthful and natural Chyle, and conſequently many of its Particles paſs farther into the Body, not ſo well attenuated and diſſolved, as in a healthful State; which cohering in thoſe Places where the Motion of the Blood is moſt languid, will gradually inviſcate the whole Maſs, and eſpecially in thoſe Parts where the Motion is naturally ſlower than the reſt, as in thoſe deſigned for the Separation of the Bile. For this Liquor being ſaponaceous, or conſiſting of a Mixture of ſaline and oily Particles, as appears by its Effects in the animal Oeconomy, and its taking out Spots, Stains, Greaſe, and the like, equally with any other Soap, it was neceſſary, not meerly becauſe it is of a thicker Conſiſtence than moſt other Juices, as Authors generally imagine, which is too often its Fault, and at beſt only the Conſequence of its Texture as a ſaponaceous Body, but chiefly for the better Union of its ſaline and oily Parts, that it ſhould be carried by a greater *Ambages*, and ſlower Motion than the reſt; and alſo that by being detained longer in the Body, its ſaline and oily Particles might be attenuated, and rendered more active and pungent by the Heat of the Body; whence its Faculty of diſſolving the Viſcoſities, and blunting the Acids of the Chyle are much increaſed, and rendered of the higheſt Service imaginable to the animal Oeconomy. Now the Blood being gradually ſtocked with theſe viſcous Particles, and their Union much promoted by its languid Motion in theſe Parts, this uſeful Liquor will be gradually clogged with a viſcous ſlimy Matter, and in a ſhort Time become unfit for theſe noble Purpoſes, increaſe the forementioned Diſorders, and a viſcous heavy Phlegm obſtruct and clog not only the *Primæ Viæ*, but the whole Habit of the Body; the Conſequences of which are Loſs of Appetite, Fulneſs, Belchings, Nauſea's, Vomitings, Coſtiveneſs, Torpor and Inactivity, Paleneſs, Hardneſs and Swelling of the Belly, *&c.* which, if not timely remedied, will produce Cachexies, Dropſies, Jaundices, Lethargies, Palſies, Apoplexies and the like. In Children, Rickets, Ruptures, Hardneſs of the Belly, and ſcrophulous and ſtrumous Swellings. In Girls, Obſtructions, Clorofis. In Women, Obſtructions of the Menſes, Barrenneſs, frequent Abortion, and the like (b). Which will chiefly happen to ſuch as are of a lax and phlegmatic Conſtitution, and eſpecially if they live a lazy, or ſedentary Life.

(b) Hippoc. *de Dicta.* Sanct. *Med.* Sect. iii. Aph. 61. Boerhaavii *Aph. de cognoſcend. & curand. Morb.* 72. *Wainwright*'s Non-nat. cap. 8.

For the moſt heavy and viſcous Food, as is the unfermented Bread of Beans, Peaſe, and the like, may well enough agree with ſuch as are accuſtomed to hard Labour, whoſe Fibres are kept always tenſe, their Fluids ſufficiently agitated, and Viſcoſities diſſolved by conſtant Motion; but will in the forementioned Circumſtances, ſooner or later, in Proportion to the Coldneſs and Laxity, or Heat and Tenſity of the Conſtitution, produce their moſt miſchievous Effects. It is true indeed theſe, and other viſcous farinaceous Subſtances may, when moderately uſed, be of no ſmall Service to thoſe, whoſe Stomachs will bear them, and Blood abounds with acrid, volatile, and alkalious Salts, whereby its Texture is too much diſſolved, and *Fluor* ſo great as to run off by large Hemorrhages, preternatural Perſpiration, and the like; theſe Things not only affording by Diſtillation an acid Spirit, apt to blunt the Force of the fiery alkaline Salts, but abating the too great Velocity of the Blood, and arreſting, and retaining the too volatile Particles by their viſcous Coheſions.

WHAT has been ſaid of Bread and its Preparations, may be equally applied to any other farinaceous Subſtances; whoſe Parts the more they are broken and attenuated by Fermentation or otherwiſe, the more eaſily digeſtible they are by the Stomach, and *vice verſa.*

NOR is this leſs applicable to ſuch Roots and Fruits as are of a mealy and viſcous Texture, as are Parſnips, Potatoes, Cheſnuts, Filberts, Almonds, Rice, and the like. Whoſe Effects are analogous to thoſe above-mentioned, and conſequently hurtful or ſalubrious in the ſame Circumſtances.

Mealy Roots, Fruits, &c.

THE greateſt Part of our other Food taken from amongſt the Vegetables may be reduced to ſuch as are of a cooling or heating Nature: Of the firſt Kind are all ſub-acid and watery Fruits, Roots, Sallads, and the like; as are moſt Sorts of Apples, Pears, Peaches, Cherries, Oranges, Citrons, Cucumbers, Melons, Lettice, Spinage, Sorrel, and many others ſo well known, as not to need a Deſcription in this Place; all

Of ſub-acid and cooling Fruits and Vegetables.

all which, partly by their viſcous Texture, and partly by the acid and watery Particles wherewith they abound, are excellently adapted to blunt and carry off the acrid, alkalious, and fiery Salts and Sulphurs lodged in the Blood, and other Juices of thoſe of a hot, tenſe, and cholerick Conſtitution; whoſe Stomachs, if not capable to digeſt them raw and unprepared, which where the Circumſtances will allow, is I think preferable to any Cookery, may make Uſe of ſuch Preparations, by boiling them ſingly, or compounding them with other Food, as may make them ſerviceable to moſt Conſtitutions of this Kind, as well as in moſt Diſeaſes where theſe acrid, and alkalious Salts and Sulphurs abound in the Blood.

On the contrary, they are highly prejudicial to all ſuch, as are of a lax and phlegmatic Conſtitution, whoſe Bile is inviſcated, weak or deficient, and unable to reduce them to agreeable Nouriſhment, which ſo long as they continue in this Form, they are altogether incapable of ſupplying; no Acid being found beyond the *primæ Viæ*, in a natural and healthful State, as is plain from numerous Experiments (d). So that not being ſufficiently blunted and altered by the Force of the Bile, they will not only during the Stay in the *primæ Viæ*, twitch and irritate the Membranes of the Inteſtines, and cauſe Gripes, Colicks, and flatulent Diſorders; but alſo when carried farther into the Body, coagulate the animal Juices, retard the Circulation, diminiſh the fluid Secretions, obſtruct Perſpiration, and cauſe a

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(d) *Othonis Tachenii Hippoc. Chymic. Boyle's* Hiſtory of human Blood.

weak Pulſe, pale and languid Complexions, Obſtructions, hyſterick and hypochondriack Diſorders, Convulſions, Jaundices, Dropſies, and the like (e).

Of hot aromatic Vegetables.

Of the latter Sort are all thoſe Herbs, Roots, Seeds, *&c.* which in the Mouth are hot and biting, of which Kind are Creſſes, Muſtard, Scurvygraſs, Onions, Garlick, Ginger, Pepper, Bitters, and Aromaticks of all ſorts, and the like. All which contain a hot, acrid, and aromatick Oil, and pungent Salt; which partly by ſtimulating the Fibres of the Stomach, and partly by attenuating and dividing the Viſcoſities lodged in it by their active Particles, increaſe its Force, and promote the Digeſtion of the Ailments contained in it. And

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(e) *Hippoc.* Loc. Citat. *Boerhaavii* Aph. N° 63. 64. *Purcel* of the Cholick, pag. 34.

And being thence carried farther into the Body, they do for the ſame Reaſon attenuate the Fluids, ſtimulate the Solids to more frequent Vibrations, increaſe the Velocity of the circulating Liquors, augment the Force and Acrimony of the Bile, promote the Secretion of the more thin and active Fluids, and cauſe a more ſpeedy Expulſion of the perſpirable Matter. On which Accounts they are of Uſe to thoſe, whoſe Fibres are too lax and torpid, Circulation of the Fluids too ſlow, and Veſſels loaded with a ſuperfluous Serum, or clogged with a viſcous and unactive Phlegm; but of the higheſt Diſſervice imaginable to ſuch, as are of a billious Conſtitution, or whoſe Fibres are already too much braced, and Fluids ſtocked with acrid and pungent Particles. In which Circumſtances, they will produce Itchings, cutaneous Eruptions, Scurvy, Leproſy, large Hemorrhages, Spitting of Blood, Conſumptions, Piles, Inflammations, burning Fevers, Heat, Thirſt, arthritic and rheumatic Pains, and the like (f). So agreeable to Truth is that Obſervation of *Lucretius*, *viz.*

Tantaque in his rebus diſtantia differitaſque eſt,
Ut quod aliis cibus eſt, aliis fuat acre venenum.

And again,

Præterea, nobis veratrum eſt acre venenum;
At capris adipes, & coturnicibus auget (g).

It

(f) *Vide Authores* & Loc. Citat.

(g) *Tit. Lucret.* lib. iv. V. 640, *&c.*

Different Effects of vegetable Subſtances whence derived.

It is true indeed the Effects of theſe as well as thoſe of the former Sort, will be ſomewhat different from each other, in Proportion to the greater or leſs Acidity, Volatility and Pungency, as well as Quantity of the oily and ſaline Particles, as alſo from the Union of their hot and acrid, or acid Particles, with others of a ſweet, pulpous, oleaginous, viſcous, reſtringent, abſorbent, terreſtrial, or auſtere Nature. Whence they will become more or leſs capable of producing the forementioned Effects, will bind or looſen the Belly, paſs off ſlower or quicker by Urine or Perſpiration, be more or leſs fitted to alter any particular Diſpoſition of the Juices, and increaſe or diminiſh ſuch Evacuations, as the Caſe and Circumſtances neceſſarily require. But to deſcend to Particulars in this

Matter,

Matter, and ſhow the different Reſult of theſe and other various Mixtures, with the peculiar Alterations induced in the animal Oeconomy by their Means, is a Work too tedious for the deſigned Brevity of this Treatiſe. And I can hardly be perſuaded, but that a more regular Uſe of the dietetic Part of Phyſick, which was that in which the great *Hippocrates*, and moſt others of the Antients chiefly excelled, would be able to cure the greateſt Part of our Diſeaſes, and that in a Method more ſafe and eaſy to the Patient, though perhaps not ſo ſpeedy, as the moſt celebrated Drugs of the Shops. Nor will this ſeem at all diſſonant to Reaſon, if we conſider that theſe Things are taken in a much greater Quantity, and more conſtantly than any Medicine poſſibly can be, and conſequently more fitted to eradicate the moſt obſtinate Diſeaſes. Which being often the Product of inveterate Habits, and confirmed Obſtructions, neceſſarily require a ſlow and gradual Alteration. Nor might they be rendered of leſs Service in the moſt acute and dangerous Caſes, according to the different Ways of compounding and preparing them; theſe being not only ſufficient to raiſe, but abate the high and impetuous Motion of the Blood and Spirits, as the Neceſſity of the Caſe, and Prudence of the Phyſician ſhall direct. Neither is it impoſſible to chuſe ſuch, as ſhall both anſwer the Deſign, in reſtoring the Health of the Patient, and be often equally agreeable with his ordinary Food. I ſhall not need to mention, how great a Number of Diſeaſes would be prevented and nipt in the Bud, by a due Application of this Part of Phyſick, into which through the Ignorance or Abuſe of it we run headlong, and whoſe pernicious Conſequences we are rarely, and that not without the greateſt Difficulty able to ſhake off. But I would not be ſo underſtood, as if I entirely diſapproved the Uſe of Medicines, which are oftentimes neceſſary for the more perfect, as well as ſpeedy Recovery of the Patient, but only point out the great Uſe and Advantages of this neglected Part of Phyſick; which, ſince this Art is become more a Trade than a Science, and ſo often proſtituted to the meaneſt Ends, is ſo little regarded, as to be ſcarce tolerably underſtood *.

Of Food taken from Animals. THE Subſtances taken from the animal Kingdom, are undoubtedly beſt qualified to repair the Loſſes our Bodies daily ſuſtain, both in their Solids and Fluids, from the conſtant Vibrations of the former, and uninterrupted Motion and Expence of the latter. For that conſtant Frication of the ſolid Parts againſt each other, muſt neceſſarily abrade and file off vaſt Numbers of ſmall ſeparable Particles, gradually weaken their Tone, and render them unfit to perform thoſe Operations, which are abſolutely neceſſary to the Well-being of our Bodies. Nor do the Fluids ſtand in leſs Need of a conſtant Supply of freſh Nouriſhment, to repair the Loſſes they ſuſtain by the uninterrupted Circulation, and Expence of Subſtance they are at, not only in ſupplying the daily Expence of the Fibres, but in furniſhing the Body with ſuch Juices, as enable it to perform the various Actions for which it is deſigned, and ſupplying the Loſs of ſuch as have performed their Office, and cannot be retained in the Body without the greateſt Prejudice.

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* ——————————— *Pudet nos*
Hæc opprobria dici et non potuiſſe refelli.

Now the Parts taken from the Body of an Animal, being ſuch as have been already applied to this Purpoſe, and conſiſting of the very Matter by which it was nouriſhed, muſt neceſſarily be better fitted to this End, than ſuch as are taken from the vegetable Kingdom, theſe being already prepared for that Purpoſe by the Action of the Stomach, Lungs, *&c.* of the Animal we feed on, and ſelected from a vaſt Quantity of Matter leſs ſuited to this End; as appears by the great Quantity of vegetable Food ſuch Animals require, as are ſuſtained by it, in Proportion to the Increaſe of Bulk from it, as well as Quantity of Excrements voided by all ſuch Creatures. So that were we ſuſtained by vegetable

Food, all this muſt be done by the Action of our own Bowels and Juices, and conſequently the animal muſt be much more nouriſhing, than the vegetable Food. Beſides the predominant Acid, as well as Viſcoſity of moſt vegetable Food, muſt neceſſarily require a greater Force in the Stomach and Bile, to reduce it to that alkalious and fluxile State, which is neceſſary to its affording a Supply to our Bodies, whoſe Juices all declare a predominant Alkali lodged in them, as is already ſhown.

Fleſh of Animals how different.

BUT notwithſtanding all this be afforded in greater Proportion from animal than vegetable Food, yet is there no ſmall Difference from the various Nature and Diſpoſition of the Animal, and Food whereon he lives. For it muſt neceſſarily happen that ſuch Creatures as are ſuſtained by viſcous and ſub-acid Food, as are all graminivorous Animals, muſt be ſupplied with a Chyle more nearly approaching to theſe Qualities, than thoſe that either feed upon Fleſh, or ſuch Plants and Seeds as abound with a hot, acrid, and aromatic Oil, and volatile Salt; whoſe Chyle muſt neceſſarily abound with more ſpirituous Particles, and be of a higher and more alkaline Nature. This is farther evident, from the different Nature of the Milk of theſe, and graminivorous Animals, which is only the Chyle a little altered, by being ſtrained and purified through the Glands of the Dugs.

Of Milks. For it is obvious to every one, how ſoon the Milk of all graminivorous Animals will acquire an acid and ſour Diſpoſition, which will not equally happen to that of ſuch

Animals as are ſuſtained by Food of an alkaline Nature, which turns rather fetid, putrid and ſtinking than ſour, ſo long as the Animal continues in a healthful State, and conſequently the Fleſh of ſuch Animals as are ſuſtained by this Sort of Food, muſt abound with a greater Quantity of alkaline Salts and Spirits, and be of a more hot and pungent Nature. Whence by the by, may be deduced the right Uſe of Milks, whether as Food or Phyſick, and in what Circumſtances Woman's, Cow's, Aſs's, or Goat's Milk is moſt convenient. To what I have ſaid may be added the natural Temper and Diſpoſition of the Animal, whether it be of an active and ſprightly Nature, or dull, ſlothful, and ſtupid. Whence the Juices by which it is nouriſhed, will be either more groſs and tenacious by their languid Motion,

tion, or more ſubtilely divided and volatiliſed, by their greater Velocity and Attrition againſt each other. For it is ſufficiently evident from numerous Experiments, that the ſpirituous Parts of any Liquor, are not originally latent in it in that Form, but produced by the inteſtine Motion and Attrition of their conſtituent Parts againſt each other, during their Fermentation; whereby the ſaline and oily Particles are broken and divided, and become more ſharp and pungent, and ſpecifically lighter than before. Thus Muſt, which is the unfermented Juice of Grapes, or a Decoction of Barley, or any other Grain, before Fermentation yield large Quantities of Oil, and fixed Salt, but no Spirit; but when ſufficiently fermented, the Quantity of theſe Subſtances is much abated, and a proportionable Quantity of Spirit afforded in their ſtead. The ſame is in a great Meaſure true of the animal Juices, which after Fermentation or Putrefaction, yield a much greater Quantity of a volatile *Alkali* than before, as appears in Diſtillations of Blood, Urine, and the like. Whence it will neceſſarily follow, that ſince all our moſt hot, alkalious, and active Salts and Spirits, are the Product only of a greater Motion, thoſe Animals whoſe Juices are moſt rapidly moved, and hurried about in the Circulation with the greateſt Velocity, muſt conſiſt of more active and ſubtile Parts, and afford a Nouriſhment extreamly different from thoſe whoſe Fluids are viſcous, and move with a ſlow and torpid Motion, and conſequently this Sort of Food be of the greateſt Service in ſuch Caſes, where the Fibres are too lax and torpid, the Blood loaded with a viſcous and ſerous Matter, and the Motion of the Fluids too languid and ſlow.

Faculties of Animals whence different.

HENCE we may at one View behold the different Nature and Diſpoſition of the whole animal World, not only in Relation to us as our Food, but even with Regard to their very Faculties, whether natural or intellectual, in Reſpect of each other. Hence we may diſcern to what Conſtitutions, and in what Circumſtances each particular Species, as it is more or leſs ſtocked with theſe acrid, alkalious, and fiery Salts and Sulphurs, or conſiſts of more mild, ſmooth, oily, and mucilaginous Parts, is moſt hurtful or ſalubrious. Hence we have a Reaſon, why ſuch Animals as are ſuſtained by Fleſh, or its Preparations, or otherwiſe high kept, are commonly more active, ſagacious, bold and daring, than ſuch as are nouriſhed by more groſs and viſcous Food; the Fluids being more ſtocked with volatile alkalious Spirits, the Fibres more tenſe and ſpringy, and ſuſceptible of the ſlighteſt Impreſſions. Hence we may ſee, why ſuch Quadrupeds as feed on herbaceous Plants, are not only more timorous than the former, but afford the moſt benign Nouriſhment to ſound and healthful Conſtitutions; their Fluids being ſufficiently, but not overſtocked with alkalious Nouriſhment, and wanting thoſe too fiery and volatile Particles, with which thoſe Animals abound, which are ſuſtained by more hot and pungent Food. Hence we may ſee, why ſuch Fowls as live on hot and pungent Seeds, and are in almoſt conſtant Motion, as are moſt ſmall Birds, afford the higheſt and moſt alkaline Nouriſhment. Hence we may ſee why the Fleſh of moſt tame and home-bred Animals, which commonly live an idle ſlothful Life, and are leſs expoſed to the Severity of the Weather, is more lax and ſupple than thoſe that are wild, or accuſtomed to laborious Exerciſes. Hence we may ſee, why the Fleſh of all young Animals, whoſe Fibres have not acquired that Hardneſs by Motion, and the continued Impulſes of the Fluids upon them, is more lax and tender, their Fluids more mild and mucilaginous, and leſs ſtocked with acrimonious Particles than thoſe that are old, and conſequently fitter for ſuch as are of a hot, tenſe, and cholerick Diſpoſition. And laſtly, Hence we may ſee the different

Natures and Diſpoſitions of the whole Tribe of aquatick as well as terreſtrial Animals, the various Qualities of freſh and ſalt Water Fiſh, of ſuch as live in clear and running Waters, or are bred in ſtagnating Meeres or Ponds, or are naturally of a ſprightly or torpid Diſpoſition.

Effects of different Preparations.

NOR is it more difficult from what has been ſaid, to deduce all the different Effects, conſequent on the various Methods of cooking and preparing our Food, of what Kind ſoever. Hence appears the different Degree of Humidity in the Parts of boiled and roaſted Meat. Hence may be deduced the Effects of Broths, Jellies, Gravies, *&c.* Hence we may ſee the Effects of dried, ſalted, ſpiced, baked, and potted Meats. And laſtly, Hence appear the Conſequences of all our Soups, Sauces, Pickles, *&c.* whether of an hot, acrid, ſalt, aromatic, and alkaline, or acid, cooling, watery, ſmooth, ſweet, or oleaginous Nature; as well as various Compoſitions, ariſing from their different Mixtures and Proportions.

Of Drinks and their Effects.

FROM what has been ſaid of ſolid Food, it is eaſy to conceive the different Effects which moſt Sorts of Liquors, in Uſe for common Drink or otherwiſe, will have upon our Bodies. Thus the Uſe of ſmall, cooling, watery, and unfermented Liquors, muſt neceſſarily be of Uſe in thoſe Caſes and Conſtitutions, where ſub-acid Fruits and Vegetables, farinaceous Preparations, and the like, are of Service. And the hot, vinous, and ſpirituous Liquors, promote the Diſeaſes conſequent on a hot and acrid Diet, in thoſe, who are of a tenſe and bilious Conſtitution. On the contrary bitter, aromatic, ſpirituous, and moderately aſtringent Liquors, are of the greateſt Uſe in thoſe Conſtitutions, where the Fibres are too lax and torpid, Perſpiration diminiſhed, and the Motion of the Fluids too ſlow; as thoſe of a cooling Nature promote the Diſeaſes conſequent on a ſub-acid, watery, and viſcous Diet, in Conſtitutions of this Kind.

Of Coffee, Tea, &c.

HENCE appear the Effects of Coffee, Tea, and the like Liquors, ſo much in Uſe amongſt the Ladies, and I doubt not frequently to their great Prejudice; the Bitterneſs and Acrimony of ſome of them, eſpecially of Coffee, which contains a hot, acrid, and empyreumatick Oil, and pungent Salt, being prejudicial to ſome, as the too great Quantity of Water in moſt Teas is to others: Thoſe of a hot, tenſe, and cholerick Habit being unable to bear a long Uſe of the former; and thoſe of a lax and phlegmatic one, highly injured by the conſtant Uſe of the latter.

AN
ESSAY
ON
Contagious Diſeaſes.

AN

ESSAY

ON

Contagious Diſeaſes:

More particularly

On the Small-Pox, Meaſles, Putrid, Malignant and Peſtilential Fevers.

Letiferis calidi ſpirârunt Flatibus Auſtri,
Conſtat et in Fontes vitium veniſſe, Lacuſque,
Omnia Languor habet, Sylviſque, Agriſque, Viiſque
Corpora fæda jacent, vitiantur Odoribus Auræ,
Afflatuque nocent, et agunt Contagia late.

OVID.

Firſt publiſhed in 1721.

THE PREFACE.

THE Deſign of this ſmall Treatiſe being to deduce the Cauſes, and explain the Phœnomena of ſome of the moſt fatal Diſeaſes which afflict Mankind, can ſtand in Need of no Excuſe, whatever the Performance itſelf may; and eſpecially at a Time, when not only ſeveral of them rage among us with uncommon Violence, but we are daily threatened with the dreadful Calamity of a raging Peſtilence. I have endeavoured to reduce theſe Diſeaſes to the ſame Simplicity with thoſe, which Phyſicians are daily converſant *with, to ſpeak equally intelligibly of them, and ſhow the real Changes in the animal Oeconomy, from the Principles of the modern Philoſophy.*

The learned Authors who have already wrote on this Subject, have rejected this Part of it, as a Matter ſo eaſy and obvious as in their Opinion of it to need no Explanation. I doubt not indeed but this is their Caſe: But how eaſy ſoever it may be to explain theſe Phœnomena, *it is not every one, though converſant in the Practice of Phyſick, that will give himſelf the Trouble to deduce them; and it is for ſuch chiefly that this ſmall Tract is deſigned; to whom if it prove any Way ſerviceable, I ſhall gain the End I propoſed by it.*

York, *June* 1ſt.
1721.

OF

Contagious Diſeaſes.

CHAP. I.

CONTAGIOUS Diſeaſes are generally defined by Phyſicians to be ſuch, as are capable of being communicated to us by the Air, or the Effluvia of morbid Bodies. When the Cauſe producing theſe Diſeaſes is general, and not occaſioned by the peculiar Qualities of particular Places, but brought from ſome foreign or remote Cauſe, they are ſtiled Epidemic.

The Cauſes therefore of theſe Diſeaſes muſt either be generated in the Air, or produced from the Effluvia of animal, vegetable, or mineral Subſtances floating in it. And conſequently the Effects of the contagious Particles muſt be extreamly various, according to the Qualities of the Bodies from which they are produced; and as they become more or leſs pernicious by the various Combinations, they are ſuſceptible of, to which no Limits, I apprehend, can be ſet by the Power of mere human Abilities.

When any of theſe Cauſes is of ſo deleterious a Nature, as not only to be infectious, but to deſtroy all or moſt of thoſe that are affected by it, that Diſeaſe is called a Peſtilence.

But before I proceed to examine the particular Properties and Effects of the contagious Particles, it will be neceſſary to demonſtrate the following Propoſitions.

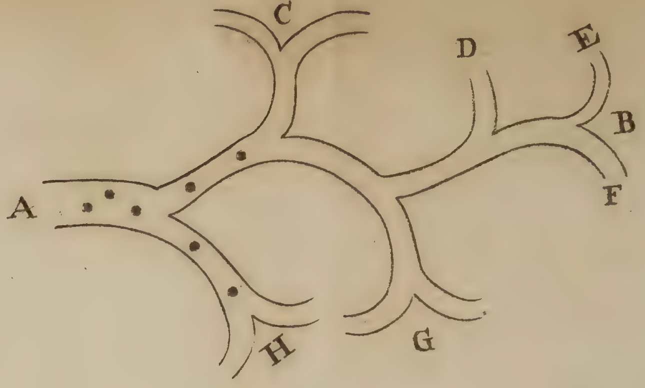
PROP. I.

The Magnitude of the Particles of the Blood being increaſed, Obſtructions will be formed in the Ramifications of the ſmaller Veſſels, which will happen ſooner or later, in Proportion to the encreaſed Magnitude of the Particles, and the Smallneſs of the Veſſels.

Demonſtration.

Let the Canal A be an Artery of a middle Size, ſending out the Branches C, D, E, F, G, H; let the Dots repreſent the encreaſed *Moleculæ* of the Blood, it is evident that theſe muſt be ſtopt ſome where or other in the Ramifications of the

Fig. 1



App. Fig. 1

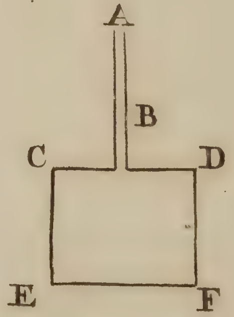
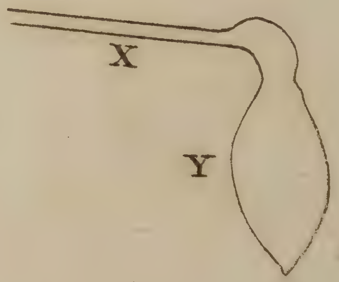


Fig. 2



Veſſels C, D, E, F, G, H, whenever the Diameters of the *Moleculæ* exceed thoſe of the Veſſels, through which they ought in a natural State to be conveyed.

PROP. II.

THE Magnitude of the Particles of the Blood being increaſed, ſuch of the capillary Veſſels as are neareſt the Heart will be ſooneſt obſtructed, and *vice verſa*; the reſt in Proportion to the Velocity of the Blood, Diameters of the Canals, and their Diſtance from the Heart.

Demonſtration.

THIS is ſufficiently evident from the foregoing Propoſition. For the ſooner thoſe *Moleculæ* arrive at the capillary Veſſels, the ſooner thoſe Veſſels will be obſtructed, and *vice verſa*, and conſequently *cæteris paribus*

bus the Capillaries of the Branches C, H, in the preceding Figure, which are neareſt the Heart, will be ſooner obſtructed than thoſe which are removed to the Diſtance of the Capillaries E or F.

PROP. III.

THE Magnitude of the Particles of the Blood muſt be increaſed either by the Union of a greater Number of them than is conſiſtent with a natural and healthful State; or by the Alteration of the natural Figure of the Particles, by which their Surfaces become larger than before.

Demonſtration.

THIS is evident from the Obſervations of *Lewenhoeck* and *Malpighi*, as well on the perſpirable as on other ultimate Veſſels, which became viſible to them by the Microſcope, and conſequently larger than the Orifices of the Lacteals, which their beſt Glaſſes could not diſcover. Whence it will follow, that no Particle can paſs this Way into the Blood, which ſingle can obſtruct the Veſſels, and conſequently this Effect can only be produced by the Action of the Particles upon each other, *viz.* either by the Union of a greater Number, or ſome Alteration in their Figures, whereby their Surfaces become larger than before. Thus the Globules of the Blood as appears by the Microſcope, are nearly of a ſpherical Figure, which being the moſt capacious, as well as moſt apt to conſtitute a fluid Body, by touching in the feweſt Points, the farther any Particles deviate from this Figure, the more likely they will be to obſtruct the Veſſels, and *vice verſa.*

PROP. IV.

THE contagious Particles being admitted into the Blood, do there alter the Figure and Texture of its component Parts, and form *Moleculæ* of a larger Size than ordinary.

Demonſtration.

The Force of the Heart and Cavities of the Canals being the ſame, when the Infection is firſt taken, as before, the Blood would paſs with the ſame Facility through the Veſſels as at other Times, and Obſtructions could not be formed, were not the *Moleculæ* thus increaſed; as our Senſes ſhow they are by the Eruption of Puſtules in the Small-Pox, by the great Inflammations, Mortifications,

fications, Buboes, and Carbuncles in malignant and peſtilential Fevers; and conſequently the contagious Particles do increaſe the Bulk of ſeveral of the conſtituent Parts of the Blood, by altering the Figures of its Particles, and forming *Moleculæ* of a larger Size than in a natural State.

◆

CHAP. II.

IT has been the conſtant Obſervation of Phyſicians, as well antient as modern, and confirmed by numerous Inſtances, that a hot and moiſt Conſtitution of the Air, joined with ſoutherly Winds, was generally a Fore-runner of malignant and peſtilential Fevers. Thus *Hippocrates* obſerves, that the Conſtitution of the Air preceding that malignant Fever deſcribed in the third Book of his Epidemics, ‘ was ‘ calm, moiſt, and ſoutherly, and ‘ ſucceeded a hot and dry Seaſon ; ‘ the Winter, calm, cloudy, rainy. ‘ warm, ſoutherly ; ſome Showers, ‘ and northerly Winds about the ‘ Equinox ; the Spring, calm and ‘ ſoutherly, with great Rains ; the

'Summer very hot, with little Wind, 'and much Rain about the Dog-'days (a).'

Some Authors led by the Title of this Book of his Epidemics, *viz.* Κατάστασις Λοιμώδης, or the peſtilential Conſtitution, have imagined the Diſeaſes here ſpoken of, to be the ſame with that terrible Plague deſcribed by *Thucydides*, which taking its Riſe in *Æthiopia*, and paſſing thence through *Lybia* and *Ægypt*, miſerably haraſſed all *Perſia*, *Phœnicia*, *Judea*, *Greece*, and *Cœle Syria*, and was one of the moſt dreadful Calamities of this Kind that ever appeared in the World. But whoſoever will give himſelf the Trouble to compare the Symptons of the Fevers here deſcribed by *Hippocrates*,

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(a) *Hippoc.* Epidem. lib. iii. ſect. 3. *Galeni* Com. in hunc Loc. *Titi Lucret.* lib. vi.

Hippocrates, with thoſe related by that accurate Hiſtorian (b), who experienced its grievous Effects in himſelf, and alſo viſited many others in it, will find that there is not the leaſt Similitude between them. The one being highly infectious, and not the leaſt Appearance of a peſtilential Contagion in the other: *Galen* alſo the beſt Interpreter of *Hippocrates*, in his Comment on this Book of his Epidemics ſuſpects, this Title to be ſpurious, though both he and others obſerve much the ſame Conſtitution of the Air to be the Fore-runner of theſe Diſeaſes.

What Places moſt ſubject.

PESTILENTIAL and malignant Fevers, are likewiſe obſerved to be the moſt frequent in thoſe Places, where the Climate is hot and ſcorching, and eſpecially when Rains fall in ſuch Seaſons of the Year. Thus in *Ægypt* and ſome other Parts of *Africa*, if Rains fall during the Months of *July* and *Auguſt*, the Plague uſually breaks out the *September* following (c).

(b) *Thucydides* lib. ii.

THIS is ſtill more remarkable in ſuch Places, as not only are ſituated in the forementioned Climate, but are likewiſe deprived of a conſtant Succeſſion of pure and clear Air. An Inſtance of this we have in *Grand Cairo*, which beſides being ſubject to the common Diſadvantages of the Country, (as are a Climate hot and ſcorching, a Situation low and flat, expoſed chiefly to the warm Winds, affording no Water for the common and ordinary Uſes of the Inhabitants, but ſuch as is fetid and ſtagnating, reſerved in Vaults and Canals, which are annually filled by the Overflowing of the River, the Air abounding with putrid Steams and Exhalations, ariſing from the Parts of Animals, Vegetables, and other Subſtances brought down and there ‘ depoſited by the River), lies cloſe ‘ under the Hill of the Caſtle, by ‘ which all Wind and Air is inter‘ cepted, which cauſes ſuch a ſti‘ fling Heat there, as ingenders ‘ many Diſeaſes (d).’

(c) *Joan. Leon.* Hiſt. *Afric.* lib. i. cap. 10. *Purchas* Pilgrim. lib. vi. cap. 17. *Athan. Kircheri Scrutin. Peſtis*, pag. 179.

That theſe may juſtly be eſteemed the Cauſes of the greater Frequency of theſe Diſeaſes in this Place, than others in the ſame Climate, appears from there being ſo rarely known in thoſe Places, which though equally hot, enjoy an Air free from

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(d) *Thevenot*'s Travels, Part I. pag. 128.

Vapours (e). Thus in *Numidia* and ſome other Parts of *Africa*, the Plague is ſcarce to be found once in a hundred Years, and hardly at all in the Land of *Negroe* (f).

Several Cauſes of the Plague.

THE other Obſervations of the Cauſes of theſe Fevers, may be reduced to ſuch as ariſe from the Stinks of ſtagnating Waters in hot and cloſe Weather, to ſome putrid Exhalations of the Earth, to the Parts of Animals and Vegetables putrifying in the open Air, or the taking of corrupt and unwholſome Nouriſhment.

OF the firſt Kind was that at *Selinis*, occaſioned by the ſtinking Exhalations of the ſtagnating Waters adjacent, which the diſcerning

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(e) *Piſo* Hiſt. *Ind.* & *Braſil.*

(f) *Purchas* Pilgrim. lib. vi. cap. 13.

Empedocles removed by ſcouring its Ditches from their Filth, by a freſh Current of Water drawn from two Rivers in the neighbouring Country (g).

To

(g) *Plutarchi* lib. περὶ πολυπραγμοσύνης.

The Cauſe here aſſigned by the Author for the Origin of contagious and malignant epidemic Diſeaſes is much more frequent, and general, than is commonly imagined, and well deſerves the Rank and Precedency allotted it. For that the Inhabitants of *Selinis*, reſiding within ſuch an Atmoſphere, ſhould be afflicted with a peſtilential Diſeaſe, cannot appear at all wonderful to any one, who conſiders, that the moſt acrid, cauſtic, and poiſonous Plants, which the vegetable Kingdom affords, derive their Growth and noxious Qualities from the moſt ſtinking and putrid Waters: So ſenſible were the Antients of this Source for the moſt grievous Calamities that befel them, that in the heathen Mythology, the angry Gods are repreſented, as having Recourſe themſelves to the *Stygian* Waters, as to a Reſervoir of Evils, from whence they might pour down more effectually their Vengeance upon Mankind.

Peſtis et Ira Deûm Stygiis ſeſe extulit undis;

To the ſecond Claſs may be reduced the peſtilential Fever, which the ſame great Philoſopher checked at *Agrigentum*, by ſtopping the Mouths of ſome neighbouring Mountains, whoſe pernicious Fumes had infected the adjacent Country (h); as alſo that mentioned by *Ammianus Marcellinus*, which broke out in *Seleucia*, and over-ran a great Part of *Greece*, *Italy*, and *Parthia*, and took its Riſe from the opening of an old Vault in the Temple of *Apollo*.

To the third belong, ſuch as are occaſioned by the Parts of Vegetables and Animals, eſpecially thoſe of the human Species putrifying in the open Air. As was that mentioned by *Livy*, which was of ſuch an infectious Nature as ſpread itſelf over a great Part

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(h) *Diog. Laert.* in Vita Empedoc.

of *Italy*, and owed its Riſe to the dead Bodies of the *Romans* and *Fidenates* left unburied in the Field of Battle (i). Analogous to this was that which from the ſame Cauſe appeared in *Germany*, *Anno* 1630; and likewiſe that mentioned by *Ambroſe Parè* from the ſame Cauſe; as alſo that mentioned by *Diodorus Siculus*, occaſioned by great Quantities of Locuſts driven by Winds into the Sea, and thence caſt up in Heaps on the Shore. To this likewiſe muſt be reduced thoſe malignant and peſtilential Fevers, which ſo frequently attend Camps and Sieges, eſpecially in the hot Eaſtern Countries, whoſe numerous Armies frequently feel the diſmal Effects of theſe ſtinking Fumes: As do likewiſe the vaſt Caravans of the *Mahometans*

(i) *Tit. Livii* Hiſt. *Roman.*

hometans in their annual Pilgrimages to *Mecca* (k).

(k) To what is here alledged by the Author as a Proof of the virulent State of the Atmoſphere, at particular Times and Seaſons over certain Diſtricts, it may not be amiſs to take Notice, that the very Dews, which ariſe in ſuch Places, where any one of the foregoing Circumſtances are preſent, afford a moſt convincing Argument, that the Air is on ſuch Occaſions actually impregnated with Particles deſtructive to the Well-being both of the vegetable and animal Kingdom; inaſmuch as the Plants and Fruits, whereon by Accident they at any Time alight, not only fall into immediate Decay and Putrifaction; but inſtead of affording an innocent and wholeſome Food, as formerly when untainted, are now converted into a rank Poiſon, and that chiefly by what adheres to the Surface, which alone when taken ſeparate from the Fruit, has been found to produce the moſt dreadful Phænomena in the animal Syſtem, raiſing Bliſters whenever it is ſuffered to lodge, or even come in Contact with the Skin, and frequently cauſing cancerous Excoriations in thoſe Organs, which ſerved as the unhappy Inſtruments of its further Conveyance into the Body, the Truth of which Obſervation the Reader may find abundantly confirmed to him, by ſeveral ſurpriſing and authentic Inſtances recited at large in the *Miſcellanea Curioſa*.

To the laſt belong thoſe peſtilential Fevers, which take their Riſe from a preceding Famine, as was that in *Judea* in the Time of *Herod* (1), in which the Product of the Ground being conſumed by the great Heat, and long Drought of the preceding Summer, the pooreſt Sort of People were obliged, through the Scarcity of Proviſions, to make Uſe of ſuch Food as afforded unwholeſome and putrifying Juices.

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(1) *Joſeph.* Antiq. *Judæor.* lib. xv. cap. 12.

CHAP. III.

THE Changes wrought in the animal Oeconomy from the abovementioned Cauſes, may be reduced to ſuch as depend either on the increaſed Heat of the Air joined with its Humidity; or to ſuch as are produced from the particular Qualities of the putrid and contagious Particles floating in it; or to the united and complicated Effects of all together.

Effects of a hot and moiſt Air.

THE Alterations produced in the Body from a greater Heat continually ſurrounding it, provided it be not exceſſive, are a Rarefaction of the Juices, and Relaxation of the Fibres on the Surface of the Body, and greater Derivation of the Fluids that

Way. Whence proceeds a large Evacuation of the perſpirable Matter. This being continued in a greater Proportion than in a natural State, will gradually deprive the Blood of its aqueous and ſpirituous Parts, and leave the remaining ſerous Part more ſtocked with acrid and pungent Salts, and the groſs, terreſtrious, oleaginous, and viſcous Particles more firmly united by their nearer Approach, and ſtronger Coheſion to each other.

THIS greater Heat or Quantity of fiery Particles, continually ſurrounding the Body, will neceſſarily inſinuate itſelf into, and unite with the ſaline, ſulphureous, and other Particles, in the ſame Manner as we ſee it does with other Subſtances, both ſolid and liquid (m); and likewiſe by increaſing the Velocity of the Circulation and Attrition of the Particles againſt each other, render them on theſe Accounts alſo more volatile, pungent and ſtimulating, and conſequently the Blood will conſiſt of Particles more groſs and inſpiſſated or coagulated, and likewiſe of thoſe of a more acrid and pungent Diſpoſition than in a natural State

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(m) *Boyle*'s Experim. Nov. de Pond. Ignis & Flam. *Newtoni* Optic. Quæſt. 21 & 22.

THE Blood being in this depraved Condition, the reſt of the animal Juices muſt degenerate in Proportion thereto, and the nervous Fluid, as it conſiſts of the moſt volatile and ſubtile Parts, be extreamly acrid and pungent, as well as unequal in its Texture and Fluidity, from the more viſcous Parts contained in it.

Putrid Fevers how produced.

THIS then being the State of the Blood and other Juices of the Body, it is eaſy to perceive how from very ſlight and otherwiſe trivial Occaſions, a Fever of a very malignant Nature may be produced. Thus the perſpirable Matter, from a ſlight Cold taken, being retained, or the Veſſels any otherwiſe filled by Irregularities in Diet, or others of the Non-naturals, the Weight of the moving Fluid will be increaſed, and the Circulation be more languid and ſlow. Whence the inteſtine Motion of the Particles of Blood being diminiſhed, the viſcous Parts will cohere more ſtrongly and in greater Quantities than before, and obſtruct the capillary Arteries, eſpecially in the Extremities, and a Coldneſs, Stretching, Yawning, Torpor, *&c.* neceſſarily ſucceed, the conſtant Attendants of a beginning Fever; all which will bear a Proportion to the Quantity re-

retained, and the Viſcoſity of the moving Fluid.

These Diſorders will neceſſarily be greatly increaſed on Account of the Air's Spring being weakened by its Heat, the Veſſels of the Lungs being leſs inflated, and the Globules of the Blood leſs broken and divided; and the more eſpecially muſt theſe Conſequences enſue, where the Air's exceſſive Heat, is alſo accompanied with an Exceſs of its Humidity, as Heat and Moiſture neceſſarily relax the Tone of the Fibres and Veſſels, and render them leſs ſpringy and elaſtic. Hence then the Quantity of Spirits being diminiſhed, and their Motion more feeble, the Contraction of the Heart and other Muſcles will be more weak and languid, and being ſtimulated by the Acrimony of the circulating Liquors, muſt contract more frequently than in a natural State; the Conſequence of which is Weakneſs, Faintneſs, Thirſt, and Dejection of Spirits.

THESE and the preceding Symptoms will neceſſarily continue, till ſuch Time as the groſs and viſcous Matter, being ſhook and looſened by the Action of the capillary Veſſels, is waſhed away into the Veins by the Force of the circulating Fluids, and there continues its Courſe with the reſt, till it be either attenuated and ſecreted, or lodged again in the Capillaries to excite new Diſorders.

Malignant Fevers.

Now if to this evil Diſpoſition of the Air be added a Number of pungent ſtimulating Particles, whether bred in the Body or floating in the Air, and thereby communicated to the Blood, which are apt to coagulate the animal Juices, ſo as to form *Moleculæ* of ſuch Shapes and Sizes as more obſtinately obſtruct the capillary Veſſels, and at the ſame Time ſtimulate and corrode the nervous Parts; it will neceſſarily happen, that the preceding Symptoms muſt be highly exaſperated, and a Fever of a much worſe Nature be thus produced.

HENCE then muſt follow a violent Hurry or a Kind of Colluctation of the Particles of the Fluids, the viſcid and coagulated Parts of the Blood in ſome Parts obſtructing the Circulation of the Juices, and the acrid, volatile and fiery Parts, rarefying and diſſolving others of the more liquid, to the greateſt Degree of Pungency and Volatility imaginable.

HENCE it is eaſy to perceive how the Motion of the Blood muſt neceſſarily be in ſome Parts more languid, by the Coheſion of the more viſcous Parts, in others quicker, joined with a pungent and ſtimulating Heat, from the increaſed Velocity and Acrimony of the moving Fluid, and the various Actions of the Particles upon each other, and their Impulſes on the containing Veſſels; as alſo how theſe are capable of almoſt infinite Variations, in Proportion to the different Quantities and Qualities of the conſtituent Particles.

HENCE then appears the Reaſon of that wandering and uncertain Heat and Coldneſs, in different Parts of the Body at the ſame Time. Hence appears the Reaſon of that great Inquietude and Anxiety, of thoſe uncertain and partial Sweats, Watchings, Tremors, ſtretching Pains of the Head, and the like, as will be more fully ſhown hereafter.

But before I proceed to explain the Nature of a Fever truly Peſtilential, it will be neceſſary to obſerve, that notwithſtanding the forementioned putrid Diſpoſition be generally a Prelude to a peſtilential Conſtitution of the Air, yet it has never that I know of been obſerved, that theſe Cauſes alone at their firſt Onſet, produced a real Plague or peſtilential Contagion, without the Concurrence of ſome preceding Infection, either brought from abroad, or gradually augmented from the increaſed Putrifaction of the Air, and poiſonous Steams of morbid Bodies.

Thus the putrid Air of Camps in hot Countries is frequently found to produce peſtilential Fevers, but this never happens at their firſt Onſet; the Diſeaſes firſt appearing being Fluxes, putrid, and afterwards malignant Fevers; which being exaſperated and propagated by the virulent Effluvia of diſeaſed Bodies, and the increaſed Putrifaction of the Air, grow up gradually to thoſe of a peſtilential, and exceedingly infectious Diſpoſition.

Of Putrifaction and Fermentation.

Now Putrifaction being only a Kind of Fermentation, wherein the Particles of a putrifying Body are put into an inteſtine Motion, and by their Action and Attrition broken and divided, and ſince all fermenting Subſtances do emit vaſt Quantities of ſmall ſeparable Parts, it will neceſſarily follow, that the moſt ſubtile and active Particles of the putrifying Body will be elevated into the Air, and float in it.

Effluvia from putrified Bodies, what.

THESE Effluvia conſiſt of the fineſt and moſt volatile ſaline and oleaginous Particles, highly attenuated and ſet at Liberty from the groſs Oil and terreſtrious Part, as appears from the Diſtillation of ſuch Subſtances, all which afford great Quantities of a pungent and volatile Salt. It is likewiſe obſervable, that the ſubtile oleaginous Particles being ſpecifically lighter, as well as more eaſily attenuated and divided than thoſe of a ſaline Nature, will be thrown off in greater Proportion in the Beginning of the Fermentation or Putrifaction than the heavier Salts will be, which muſt either be more attenuated and volatiliſed, or require a greater Force to raiſe them into, and ſuſtain them in the Air than the former, and conſequently the greateſt Emiſſion of theſe ſaline Particles will be after the Fermentation has been for ſome Time continued; as we find it happens in all fermenting Liquors, as Wine, Beer, Cyder, and the like. All which emit, during the Fermentation, greater Quantities of Particles of an active attenuated Oil or Spirit for ſome Time, than of a ſaline Nature, which requiring a longer Time in order to attenuate them, are not raiſed till the former are in a Manner quite exhaled, as appears from collecting the Steams of fermenting Liquors, and of thoſe which are turned ſower by Diſtillation, and conſequently Exhalations ariſing from putrifying Bodies will after ſome Time conſiſt moſtly of ſaline Particles highly attenuated and volatiliſed, and thoſe not wrapt up and ſheathed in oily ones, and thereby rendered innocent and often uſeful to the Body, but naked and excedingly acrid and poignant.

How unfit for Reſpiration is an Air ſtocked with theſe Kind of Particles appears from ſeveral of Mr. *Boyle*'s Experiments on Animals ſhut up with putrified Air in the Receiver, moſt of which with incredible Inquietude die even ſooner than *in Vacuo*, as alſo from the pernicious Effects of the Steams of Vaults, Mines, the *Grotto di Cani*, and ſuch like.

But beſides this Inaptitude of ſuch Air to expand the pulmonary Veſſels, theſe minute and pungent Particles may be conſidered as ſo many *Stimuli* or Lancets, acting upon and penetrating the Coats of the Stomach, Lungs, and other Veſſels. On which Account they are not only capable of creating great Diſorders, as Inflamation, Pain, Sickneſs, Anxiety, Vomiting, *&c.* in the Stomach and nervous Parts; but likewiſe being carried immediately into the Blood, will there ſtimulate the ultimate Veſſels, ferment, diſſolve, or coagulate the circulating Juices according to the particular Qualities and Quantity of the contagious Particles.

Nor is it unlikely, that from the various Action of the Particles upon each other, and their different Combinations in a ſtagnating Air, Particles may be formed of Qualities vaſtly differing from, and in their Force almoſt infinitely exceeding thoſe of their primogenial Salts and firſt Principles, as in Sublimate, ſome

Preparations of Antimony, *&c.* Inſtances of which thoſe verſed in Chymiſtry are no Strangers to.

Infectious Particles how produced.

Now ſuppoſing the Blood ſaturated with theſe Kind of Particles, and a malignant Fever produced by their Means, we all know that the Blood in this State throws off vaſt Quantities of ſubtile and active Particles through the perſpirable, ſalival, and other excretory Ducts of the Body, which not only muſt load the adjoining Air with great Quantities of them, and render it capable of producing more diſmal Effects than the preceding, but alſo the Particles thus thrown off muſt be endued with a more acrid and pungent Diſpoſition than the former, inaſmuch as they are more ſubtilely divided and attenuated by the Force of the Fever, than thoſe in the preceding

ceding Diſpoſition of the Air, where ſo powerful an Agent was wanting, and conſequently produce a Fever of a moſt infectious and deleterious Nature. This will more eſpecially be the Caſe when the Infection is taken toward the latter End of the Diſeaſe, at which Time the ſaline Particles will be more exalted and volatiliſed, as well as thrown off in greater Quantities, and thereby made more capable of producing an infectious Contagion.

For the Blood in theſe Circumſtances may not unaptly be compared, as was before hinted, to a fermenting Liquor, whoſe Parts being conſtantly in Motion, are continually throwing off great Quantities of ſubtile and active Spirits, capable of exciting the ſame Fermentation, and producing the ſame Qualities in thoſe of the like Species, as appears from our Manner of fermenting Ale, Beer, *&c.* with Yeaſt, which is a ſpirituous Ferment, and alſo from the ſower Ferments uſed in making Vinegar, *&c.*

ANALOGOUS to this we may obſerve, that the Blood in different Diſeaſes, as well as different Animals, throws off great Quantities of active Particles, which when mixed with the Blood of a healthful Perſon, are capable of exciting the ſame Fermentation and Diſorder in the animal Juices, with thoſe of the morbid Animal from which they exhale, as we find in the Small-pox, Meaſles, Saliva of a mad Dog, and the like.

THIS then being the Diſpoſition of the Blood and other Juices, in thoſe Fevers which we call peſtilential,

tial, it is evident, that whatever the particular Subſtance of the contagious Particles may be, they muſt be endued with ſuch Qualities as will coagulate the animal Juices, ſtimulate the Fibres to frequent Vibrations, cauſe Obſtructions in the capillary Veſſels, and render the Blood and other Juices of the Body exceedingly acrid and pungent, as appears from hence and the foregoing Propoſitions; the Symptoms and Conſequences *(cæteris paribus)* being the ſame, whether the Diſeaſe has gradually grown up to this Height, or took its Riſe only from contagious Particles brought from abroad.

How propagated. THIS is the Method by which I ſuppoſe theſe contagious and peſtilential Particles to be firſt generated and produced, in thoſe Places which are moſt ſubject to them, and thence propagated firſt into the the Neighbourhood, and afterwards to greater Diſtances by Way of Intercourſe and Commerce. The peſtilential Effluvia being packed up and conveyed in Goods of a ſoft and looſe Texture, as Silk, Wool, Cotton, and the like; and ſo much the more eaſily, as the Air into which theſe infected Materials are brought, is prediſpoſed to act in full Concert with them; as happens in all Places at ſome Times more than others; at which Time if theſe infectious Particles be communicated, they exert their Rage with the utmoſt Violence, but frequently are either diſſipated and loſt, or produce Diſeaſes of leſs fatal Conſequence, in an oppoſite Diſpoſition of the Air (m).

THUS

(m) Every Vintner can atteſt to the Truth of this Obſervation, who by Experience knows, how

Why the Plague ceaſes. THUS hard Froſt, ſtrong, cold, and northerly Winds, are found frequently to put an End to, or at leaſt bridle the Fury of contagious Diſeaſes, and render them more mild and curable, as was obſervable in the Beginning of the laſt great Plague in

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how much not only the Brightneſs, but even the Flavour of his Wines are affected, and vary by the different States of the Atmoſphere wherein they are placed and examined; and if Liquors incloſed in a ſolid Caſe of Wood, or even preſerved within that of Glaſs, are liable to undergo ſuch amazing Changes in the Texture and Arrangement of their Particles, what Effects may not the Air be capable of producing in the Fluids of the animal Body, where this Element is not only conveyed into the Veſſels in larger Quantities by its daily Food, of which it makes up a great Part, but where by its conſtant Preſſure, it muſt, as the Author has fully ſhewn in the next Chapter, gain or force its Admittance each Moment at almoſt every Pore?

in *London* (n), and frequently taken notice of in other Places by the Writers on this Subject. Conſonant to this we find in *Ægypt*, that the riſing of the *Nile* by giving a freſh Motion to, and altering the Diſpoſition of their ſtagnating and putrid Air, by the mild Vapours and nitrous Exhalations (o) iſſuing from it, immediately checks the raging of the Plague, and reduces it to a Fever of a more mild and curable Nature; inſomuch that as *Purchas* and others inform us, if there die in *Grand Cairo* 500 Perſons of the Plague the Day before, yet upon the Increaſe of the River it ceaſes to be peſtilential, and none die of it (p).

And

(n) *Hodges* de Peſte.

(o) *Boyle*'s determ. Nat. Effluv. cap. 4. *Plot*'s Nat. Hiſt. of *Staffordſh*. cap. 2. pag. 42.

(p) *Purchas* Pilgrim. lib. vi. cap. 7. *Sandy*'s Travels, lib. ii. cap. 97.

And indeed it can hardly be imagined, how the Plague when it has once got eſtabliſhed in any Place, ſhould ceaſe but with the Deſtruction of all or moſt of the Inhabitants, was it not checked by ſome Alteration in the Diſpoſition of the Air, and gradually reduced to a Fever of a more mild and curable Diſpoſition.

It will, I think, be needleſs to ſhow, that the Diſtempers here treated on, are propagated by Contagion; but it may not be altogether unneceſſary to explain by what Methods theſe Alterations in the animal Oeconomy are brought about, and eſpecially as the Means by which they are chiefly communicated, have not that I know of been fully examined.

CHAP. IV.

Of a Peſtilence by Contagion.

THE contagious Particles whether they be generated in the Air, or produced by the Effluvia of morbid Bodies, being ſuſtained in it, are thereby applied to the Surface of our Bodies, with a Force equal to the Preſſure of the incumbent Atmoſphere. This Preſſure upon the external Superficies of a human Body of a middle Size, has been demonſtrated to be equal to 39900 Pounds Troy-weight, and conſequently ſuppoſing the Body in every Part encompaſſed with theſe Particles, the whole Force with which all theſe Particles are on this Account propelled into the Body, will amount to the aforeſaid Sum. But every ſingle Particle is only applied with the Force of a Column of Air of the Height of the Atmoſphere, and whoſe Baſe is equal to the Surface of that Side of the intruding Particle, oppoſite to the cutting Angle. Now the contagious Particles from their extream Smallneſs and pungent Angles, may not only be conſidered as Bodies applied to us with the preceding Force, but likewiſe as ſo many ſmall Knives or Lancets, acting upon and penetrating the Coats of the Lungs and Surface of our Bodies, with a Force proportional to the Smallneſs of their cutting Angles.

THIS appears not only from ſeveral Propoſitions in Mechanics, but even to our Senſes, by the ſtrong Contraction of a Cord or Fiddle-ſtring in moiſt Weather. The Particles of Water from their exceeding

Smallneſs, being protruded into the Cord, with a Force capable of raiſing the greateſt Weights.

Now if to theſe be likewiſe added the ſtrong attractive Force of theſe ſmall volatile Particles, occaſioned from their Exiguity, it will be no difficult Matter to conceive, that they are capable of penetrating the Veſſels of our Bodies. Thus the attractive Force of the Magnet is greater in Proportion to its Bulk, in ſmall ones, than in thoſe of a larger Size, from the greater Proximity of all its Particles to each other. And it is on this Account that Sir *Iſaac Newton* computes the attractive Force of the Particles of Light, to be to that of other Bodies, as 1000000000000000 to 1, in Proportion to the Quantity of Matter contained in them (q).

(q) Optic. in fine Queſt. 22.

This I think is ſufficient to ſhew, that theſe acrid and pungent Particles are able to penetrate the Surface of our Bodies, and get into the Blood that way; and indeed Experience itſelf confirms it in all other pungent and acrid Subſtances, as is evident in the Application of Garlic, Cantharides, Arſenic, and all pungent and corroding Bodies.

The Preſſure of the Air on the internal Surface of the Lungs in Breathing determined.

But though the whole Superficies of our Bodies are penetrable by theſe poiſonous Particles, yet the principal Miſchief is communicated to the Blood in its Paſſage through the Lungs. For conſidering the prodigious Number of the pulmonary Veſicles, into all which the Air enters in Reſpiration, and likewiſe the vaſt Increaſe of their Surfaces on that Account, and alſo the greater

Force by which theſe Particles are applied to the internal Surfaces of the Veſicles in Expiration, in Proportion to that whereby they are applied to other Parts of the Body of equal Superficies; it will evidently appear, that the Contagion is chiefly communicated by theſe Veſſels to the Blood.

For it appears by the Barometer, that every Inch ſquare upon the Surface of our Bodies is preſſed upon by a Weight nearly equal to 1800 Drams, when the Mercury ſtands higheſt in the Barometer. Now ſuppoſing with Dr. *Keil* (r) that both the Lobes of our Lungs contain 226 ſolid Inches, of which only $\frac{1}{3}$ or 75 Inches are Veſicles. Suppoſing alſo the Diameter of a Veſicle to be $\frac{1}{50}$ Part of an Inch, the Surface of

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(r) Animal Secret.

of the Veſicle will be .001256 and the Solidity .0000043, by which if we divide 75 the Space filled by the Veſicles, the Quotient, *viz.* 17441860 × .001256 the Surface of a Veſicle, gives the Sum of the Surfaces of all the Veſicles, = 21906.976 ſquare Inches. Which Sum being multiplied by 1800, the Number of Drams which every ſquare Inch of the Surface of our Bodies ſuſtains, gives the Weight which the whole internal Surface of the Lungs ſuſtains by the ſole Preſſure of the Atmoſphere, when the Mercury ſtands higheſt in the Barometer, equal to 39442556.800 Drams, equal to 410859.966 + $\frac{64}{96}$ lib. Troy-weight, as appears from the known Laws of *Hydroſtaticks* (s).

(s) *Marriote*'s Hydroſtaticks.

Now if to this be added the increaſed Preſſure of the Air, againſt the internal Surfaces of the Veſicles in Expiration, the Force will be found to be ſtill greater. For ſuppoſing the Diameter of the Larynx to be equal to 0.5 of an Inch; ſuppoſing alſo the Preſſure of the Larynx in an ordinary Expiration, by which the Force of the expired Air exceeds the Preſſure of the Atmoſphere, to be two Ounces, as has been found by Experiment (t), the Preſſure of the Air in an ordinary Expiration upon an internal Surface of the Veſicles of the Lungs, will on this Account only be equal to 1844736 Drams, or 19216 lib. Troy-weight, which added to the Preſſure on the Veſicles by the Weight of the Atmoſphere, amounts to

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(t) *Keil*'s Animal Secretion, Edit. ult.

to 39444401.536 Drams, or 410879.182 + $\frac{64}{96}$ Pounds Troy-weight. But the Preſſure of the Air on all the reſt of the Surface of our Bodies amounts but to 39900 lib. Troy, which is to the Preſſure upon the internal Surface of the Lungs, as 1 to 10.297 + $\frac{28882}{39900}$, and conſequently many more of the contagious Particles will be communicated this Way, than through the whole Surface of the reſt of the Body.

The Weights aforementioned are indeed prodigious, but that is cauſed by the great Increaſe of Surface by the Number of the Veſicles: For it is ſtill to be conſidered, that the Preſſure upon each ſquare Inch of the Surface of theſe Veſicles, amounts to no more than the Preſſure on every Inch ſquare on the Surface of our Bodies, except that Increaſe which is made by the Force of Expiration, otherwiſe theſe Veſicles could in no wiſe withſtand ſo prodigious a Preſſure. This Quantity, *viz.* 75 cubic Inches or thereabouts ſeems to be emitted from the Lungs in an ordinary Expiration, for I have found by Experiment, that the Lungs in a larger Expiration will emit above 160 cubic Inches of Air. Having myſelf filled an exhauſted Receiver of that Size with Air at one Expiration, of the ſame Denſity with that of the Atmoſphere.

Now if we likewiſe conſider the exceeding Smallneſs of the pulmonary Veſſels, and alſo that the whole Quantity of Blood in the Body muſt neceſſarily paſs this Organ, in order to its being attenuated and made fit for Circulation; it will neceſſarily follow, that the Alterations made in the Texture of the Blood by the poiſonous Effluvia, are communicated to it chiefly through this Organ.

Besides the Lungs do not only admit the poiſonous Particles to enter into the Blood in greater Quantities, but when carried by theſe Paſſages, they become capable of doing much more Miſchief, than if conveyed in at any other Part of the Body, in regard that they are more intimately mixt with it in its Comminution.

I have inſiſted the more largely on this Argument, becauſe I find that moſt Authors who have wrote on this Subject, though they do ſuppoſe ſome of the contagious Particles may be communicated to the Blood this Way, yet lay the greateſt Streſs on the Mixture of theſe Particles with the Saliva, which being ſwallowed carries them in common with our Nouriſhment.

It is not improbable indeed, that many of theſe Particles may be this Way communicated to the Blood; but it is as probable, that many of them which are by this Way communicated, loſe much of their Force by their Mixture with the Bile and other Juices; as we ſee happens in the Poiſon of the Viper, which taken at the Mouth is not deadly, but when mixed immediately with the Blood produces the moſt violent Symptoms. The ſame may be obſerved from many other Subſtances, which may be ſafely taken into the Body by the common Paſſages, as moſt Acids, Spirit of Wine, and other Subſtances, but when mixed immediately with the Blood, by Injections into the Veſſels of living Animals, produce Coagulations, Convulſions, and Death.

The principal Reaſon which has induced Phyſicians to ſuppoſe, that the poiſonous Effluvia are chiefly communicated by theſe Paſſages, are thoſe violent Vomitings which frequently accompany it; but this happens equally in many other Fevers, where there cannot be the leaſt Suſpicion of Contagion.

The only Objection to what I have here advanced ſeems to be, that if the Contagion was communicated to the Blood chiefly by the Lungs, the Coagulations would be immediately formed there, and this Organ totally obſtructed. But if we conſider, that the chief Application

tion of the Air to the pulmonary Veſicles is in Expiration, immediately after which the Blood enters the *Vena Arterioſa*, whoſe Branches continually grow wider, and give Space and Time for the coagulating Particles to act with their full Force, this Objection will of itſelf fall to the Ground.

THE contagious Particles being by theſe Means got into the Blood, do there by coagulating and inſpiſſating the more groſs and tenacious Parts, and highly volatiliſing and attenuating others of the moſt ſubtile, reduce the Blood into the above-mentioned State. Thus we ſee that Milk, which is the Juice of an Animal, by the Addition of a ſmall Quantity of an acid Spirit, changes from an equal Texture, to one of a more groſs and viſcous, as well as more fluid and watry Subſtance. The like may be obſerved in the White of an Egg and the Blood of an Animal itſelf. Analogous to this is that Experiment of *Jo. Bapt. Alprunus*, who examining the Matter of a peſtilential Bubo by Diſtillation, found at firſt a Phlegm, then a more fat and oily Matter, and laſtly a Salt aſcending into the Neck of the Retort. But what was the moſt remarkable in this Experiment, was the prodigious Stench upon opening the Veſſels, exceeding as he expreſſes it a thouſand Wounds expoſed to the Summer's Heat, and likewiſe a Salt ſo exceedingly acrid and pungent, as to equal, if not to exceed that of *Aq. Regiæ* itſelf (u).

(u) Ph. Col. N° II. p. 17.

I ſhall not from hence pretend to determine, that an acid Salt is the immediate Inſtrument of theſe Changes in the animal Oeconomy, ſince the ſame may be wrought by Spirit of Wine, and other Liquids (x); and Experience aſſures us, that the Effluvia proceding from the putrifying Parts of animal Bodies, abound with a volatile, alkaline Salt, as appears by collecting them by the Bell, or in Diſtillation, by which they afford ſome Phlegm, a moſt fetid Oil, and exceedingly pungent and volatile Salt; but this is ſufficiently evident from what has been ſaid, that whatever the determinate Nature of the particular Particles may be, they do not only coagulate the animal Juices, and increaſe the Bulk of the Particles of the Blood, but render the remaining Part exceedingly acrid and pungent.

(x) *Boyle*'s Hiſt. Humani Sang. *Friend*'s Emmenolog. in Fine.

Consonant to this Dr. *Hodges* has obſerved a great Affinity between a peſtilential and ſcorbutic Habit of Body, and that thoſe whoſe Blood naturally abounded with ſaline Particles, and had the reſt coagulated or inſpiſſated, as happens in ſcorbutic Conſtitutions, were more grievouſly affected by the Peſtilence; and alſo that moſt of thoſe who recovered of the late Plague, were very much ſubject to ſcorbutic Diſeaſes: The like I have frequently obſerved, where the Small-pox, Meaſles, *&c.* ſeizes thoſe of a ſcorbutic Habit.

NOR is the Blood alone affected by its Mixture with theſe ſaline *Spiculæ*, but the reſt of the animal Juices alſo in Proportion, and eſpecially the nervous Fluid, which conſiſting of the moſt fine volatile and ſubtile Parts, will be rendered extreamly acrid and pungent: Whence Pain, Sickneſs, Inflammations, *&c.* muſt neceſſarily ſucceed.

CHAP.

CHAP. V.

THE Symptoms accompanying a peſtilential Fever, are Yawning, Stretching, Coldneſs, frequently to the greateſt Extremity, Shuddering, ſudden Pains in the Head, Giddineſs, Loathing, Vomiting, a low unequal Pulſe, Trembling, great inward Heat, eſpecially about the *Præcordia*, Coldneſs of the Extremities, uncertain Sweats, Inquietude, Stupor, Delirium, Watching, Convulſions, Carbuncles, Buboes, livid Veſications, purple Spots, *Hæmorrhages*, which three laſt are the certain Fore-runners of Death.

But here it is to be obſerved, that all the preceding Symptoms do not conſtantly happen to every in-

individual Perſon who is affected with a peſtilential Fever, but differ both in Number and Degree according to the Degree of Infection, Virulence of the contagious Particles, and Conſtitutions of particular Perſons; thus the more the Blood is ſtocked with acrid and pungent Salts, and other Parts rendered glutinous, coagulated, or inſpiſſated, the hotter the Seaſon of the Year, the more violent the Symptoms will be, where the Degree of Infection is equal, and *vice verſa.*

Yawning, Stretching Laſſitude.

THESE are the firſt Signs of the Seiſure of the fatal Enemy and take their Riſe from the Slowneſs of the Motion of the circulating Fluids. For the Viſcoſity of the moving Fluids being increaſed, and the *Liquidum Nervorum* degenerating in Proportion thereto, the Weight to be moved will bear a greater Proportion to the moving Force than in a natural State, and conſequently the Animal muſt be affected with Wearineſs, as we find it is in all Caſes where the Spirits are exhauſted and weakened, in Proportion to the circulating Juices.

THE other two mentioned Symptoms are the neceſſary Conſequence of this, for the Viſcoſity of the Fluids rendering them unfit to paſs the ſmall capillary Veſſels, the Preſſure on the Fibres and Veſſels will be increaſed, excite an uneaſy Senſation, and ſtimulate them to more frequent Vibrations, in order to diſlodge the Enemy: Whence follows a Contraction of the Muſcles, and eſpecially thoſe which ſerve for voluntary Motion, and into which the Spirits are moſt frequently determined.

Hence then appears the Neceſſity of ſuch a Method and Medicines as may dilute and diſſolve the cohering Fluids, and eſpecially of ſuch as are taken actually hot, and with large Quantities of Diluters, the great Activity of the fiery Particles contained in them, rendering them much more capable of penetrating into the ſmalleſt Receſſes of the Body, and disjoining the coagulated Fluids.

Coldneſs, Shuddering.

These likewiſe depend on the too great Coheſion of the ſanguineous Particles, on which Account the circulatory, as well as the inteſtine Motion of the Particles of the Blood being diminiſhed, and many of the igneous Particles intangled in the viſcous Coheſions, a Senſation of Cold muſt neceſſarily enſue, and eſpecially in thoſe Parts where the Motion of the Blood is moſt ſlow, and its Coheſion increaſed as happens in the Extremities. The nervous Juice being likewiſe for the ſame Reaſon determined irregularly, and in leſs Quantity into the Muſcles, ſometimes one, ſometimes another of them will be weakly contracted, or a Shuddering will enſue.

A low, quick, unequal Pulſe. THESE ariſe from the Secretion of a ſmaller Quantity of animal Spirits, and thoſe too unfit to actuate the Heart and other Muſcles, whence their Contractions will be more weak, and being ſtimulated by the Acrimony of the Juices they will alſo be more frequent than in a natural State. The Derivation likewiſe of the nervous Fluid into the Fibres of the Heart being irregular, for the Reaſons aforegiven, the Motion of the Heart, and conſequently of the Pulſe, muſt be weak, quick, and unequal.

Loathing, Vomiting.

THESE are occaſioned partly by the contagious Particles being drawn in with the Breath, and in their Paſſage tainting the Saliva, which when ſwallowed irritates the nervous Filaments of the Stomach, and partly by the Secretion of a more pungent and acrid Matter by its glandulous Coat; as appears from their ſpontaneous ceaſing as ſoon as a Sweat can be procured, and the Diſcharge of theſe acrid Particles promoted by the perſpirable Glands (u), and ſeldom otherwiſe.

Diarrhœa.

A Diarrhœa is likewiſe oftentimes a concomitant of theſe Fevers, and

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(u) *Sydenham* de Peſte.

ever of moſt dangerous Conſequence in the beginning of the Diſeaſe, inaſmuch as it exhauſts the Strength of the Patient, and prevents the regular Expulſion of the perſpirable Matter, by which, as Experience aſſures us, theſe contagious Particles are moſt effectually diſcharged.

THESE then indicate ſuch Medicines as cleanſe the *Primæ Viæ* from the contagious Particles, and other Crudities lodged in them, blunt the Acrimony of the ſaline Particles, and promote the regular Expulſion of the perſpirable Matter.

Coldneſs of the Extremities. THIS is occaſioned by the weak Contraction of the Heart, and greater Viſcoſity of the Blood in the extream Parts of the Body; for the circulating Fluids being preſt on every ſide by the containing Veſſels, the more thin and liquid Part will paſs into ſuch Veſſels as ariſe neareſt the Heart, and leave the reſt more viſcous and unfit for Motion. The Force of the Heart in the extream Parts being alſo much diminiſhed, through the numerous Ramifications of the Veſſels, the Motion of the Blood will be more ſlow, the Coheſion of the Particles of the Blood greater, and the Obſtructions in the Capillaries more fixt than in other Parts of the Body. Now the Heat of the Body depending in a great Meaſure on the Attrition of the Particles againſt each other, this being diminiſhed in the extream Parts of the Body, the other muſt be leſſened in Proportion.

Great inward Heat eſpecially about the Præcordia.

THIS is occaſioned by the greater inteſtine Motion and Colluctation of the Particles of the Blood, and the expanſive Particles of Heat being in greater Proportion in theſe than other Parts of the Body, which, the more numerous Ramifications and Obſtructions of the Veſſels, and their Proximity to the Heart, as appears by *Prop.* II. muſt unavoidably produce.

Inquietude Watching,

These ariſe from the ſame Cauſe as the preceding, the great inward Heat being a conſtant *Stimulus* to the nervous Parts, and obliging the Sick to ſeek continual change of Place and Poſture, in order to abate this uneaſy Senſation.

These therefore indicate the Uſe of ſuch Medicines as ſpecifically correct the acrid and ſtimulating Particles, reſtrain the inordinate Effervеſcence of the circulating Fluids, and attenuate the viſcous Coheſions; of which Kind are diluting and attenuating Acids, temperate Cordials and Anodynes, in ſuch Doſes and Proportions, as are agreeable to the Age, Strength, and other Circumſtances of the Patient.

Delirium. THIS ariſes from the inordinate Influx of the *Liquidum Nervorum*, occaſioned from its Acrimony, Viſcoſity, and Quantity, different from thoſe in a healthful State. Whence the Reflux of the Spirits to the Brain will be altogether irregular, and the Repreſentations brought by them irrational and inconſtant. As this Symptom may ariſe as well from the increaſed as leſſened Quantity, and different Texture of the Fluids, and Springyneſs of the Solids; ſo regard muſt be had to the particular ſtate of the Solids and Fluids in every Individual, for the abating of this Symptom.

Stupor. THIS Symptom neceſſarily ſuppoſes the Flux of the Spirits through the Brain and Nerves in ſome meaſure intercepted or diminiſhed, and generally in theſe Caſes ſhews a greater Degree of Coagulation in the Juices than the former, and conſequently of greater Danger from the more numerous Obſtructions in the capillary and nervous Veſſels. Agreeable to which is that Obſervation of Dr. *Hodges*, that they who were attended with this Symptom rarely recovered.

Trembling, Faultering in the Speech. THESE depend on the ſame Cauſe as the former, *viz.* on the Diminution or Obſtruction of the *Liquidum Nervorum*, whereby the Muſcles are involuntarily and weakly contracted.

As theſe Symptoms in this and the foregoing Paragraph, ſuppoſe a more torpid Motion and greater Viſcoſity of the Fluids, and leſs Degree of Elaſticity in the ſolid Parts, ſo the Method taken herein ought to be more active and ſtimulating than in any of the foregoing Symptoms, Whence Epiſpaſticks, and the moſt volatile attenuating Medicines are more neceſſarily required, and ought to be oftner repeated, than in the preceding Symptoms.

Pain in the Head.

This is occaſioned by the Obſtruction of ſome of the capillary Veſſels of the Brain by the coagulated Part of the Blood, and the wounding of the nervous Filaments by the poiſonous ſaline *Spiculæ.* Whence the Blood being reſiſted in its Motion, muſt preſs more ſtrongly againſt the Sides of the Veſſels, and diſtend them beyond their natural Diameters, and produce a ſhooting and throbbing Pain; and if the Obſtructions continue or increaſe, a Phrenſy, Inflammation, Suppuration, and Gangrene of the Part affected. Why this Symptom ſhould be one of the firſt, as well as a conſtant Attendant through the whole Courſe of the Diſeaſe, appears from *Prop.* II.

Carbuncles, Buboes, &c. HENCE likewiſe appears the reaſon of Carbuncles, Buboes, Veſications, and the like, which take their Riſe from the ſame Cauſe, and are different only in Proportion to the Viſcoſity or Acrimony of the obſtructing Matter, and the Situation and Structure of the Part affected.

Purple Spots, Hemorrhages. THESE ſhow the greateſt Corroſion and Acrimony imaginable in the circulating Fluids, ſo as to be able to break and deſtroy the very Veſſels themſelves, and conſequently certain Signs of a ſpeedy Diſſolution of the whole animal Oeconomy.

Diſſections of ſuch as have died of malignant and peſtilential Diſeaſes.

THE Diſſections of ſuch as have died of theſe Diſeaſes are a farther Confirmation of the foregoing Theory, inaſmuch as they demonſtrate a greater Acrimony and Coagulation in the Juices than in other Diſeaſes, by the numerous Obſtructions Inflammations, and Mortifications of different Parts of the Body. Thus the Stomach and Inteſtines are commonly highly inflamed, and frequently gangreened. The Lungs, Diaphragm, and ſeveral of the *Viſcera* inflamed, obſtructed, and beſet with Carbuncles and purple Spots. The Arteries of the *Dura* and *Pia Mater* obſtructed, and ſtuffed with grumous

Blood, and often mortified. The Arteries of the whole Body in general fuller than ordinary, the Veins more empty. The Veſſels near the *Præcordia* much obſtructed, highly inflamed, and often gangreened. The membranous Parts of the Body in general more dry and rigid than in moſt other Diſeaſes.

CHAP. VI.

Of the SMALL-POX.

FROM what has been ſaid of the Nature of malignant and peſtilential Diſeaſes, it will follow, that the contagious Matter producing the Small-pox does likewiſe coagulate the Blood, and increaſe the Bulk of its conſtituent Particles; and that in ſuch a Proportion as is capable of obſtructing only the ultimate and perſpirable Veſſels; as appears, in that it principally, if not ſolely affects the membranous Parts of the Body, as well external as internal. Now theſe Parts being formed of ſuch Veſſels, the Puſtules could not happen in theſe, more than in other Parts of the Body, were not their Veſſels thus obſtructed;

and obſtructed they could not be, but from the increaſed Bulk of the ſanguineous Particles, and that in ſuch a Proportion as renders them capable of penetrating into, but not paſſing through the Cavities of the ultimate Veſſels, as appears from the preceding Propoſitions, and conſequently the contagious Matter producing the Small-pox, muſt be indued with this peculiar Property.

And indeed if we allow the different Degrees of Coagulation in theſe contagious Diſeaſes, and which appear even to our Senſes, it will appear, that the principal if not the ſole Difference proceeds only from the greater or leſs Bulk and Number of the coagulated *Moleculæ*, and Acrimony of the coagulating Matter. Thus we ſee that in peſtilential Diſeaſes,

eaſes, where the degree of Coagulation and Acrimony of the Juices are ſuperior to the reſt, the Obſtructions happen in the larger Glands, as are thoſe of the Armpits, Groin, *&c.* The Circulation of the Blood being obſtructed, or at leaſt much retarded in the capillary blood Veſſels, as appears from the weak Pulſe, Coldneſs of the Extremities, and the like, which conſtantly accompany it; and conſequently the *Moleculæ* formed by the Coagulation of the animal Juices muſt be larger, than thoſe in the Small-pox, which proceed to the ultimate Veſſels before the Obſtructions are formed.

THE Meaſles are another Confirmation of this Theory, whoſe *Moleculæ* are ſtill leſs than the preceding, as appears by their Eruption with greater Flatneſs, and leſs Extenſion of the obſtructed Veſſels. Thus alſo we ſee that in all theſe Diſeaſes where the contagious Matter is more virulent than ordinary, or the Conſtitution of the Year more productive of theſe Diſeaſes, or joined with a hot, tenſe and ſcorbutic Diſpoſition, Diarrhœa's, Dyſenteries, purple Spots, Hemorrhages, Phrenſies, Convulſions, Inflammations, *&c.* equally accompany theſe as peſtilential Diſeaſes.

From what has been ſaid in this and the foregoing Chapters may be deduced the Reaſons of the greater or leſs Virulency of the Small-pox, Meaſles, *&c.* in ſome Years more than others; as alſo why theſe Diſeaſes ſhould rage with the greateſt Violence when joined with, or immediately preceding a peſtilential Conſtitution of the Air.

Hence alſo appears the Reaſon, why pains of the Head, Stomach, Loins and Back, precede the Eruption of the Puſtules, theſe Parts as neareſt the Heart being ſooneſt obſtructed, and the *Impetus* of the Blood againſt the obſtructed Canals much greater than in the reſt of the Body. As alſo why the Puſtules ſhould appear ſo much ſooner in the Face, Neck and Breaſt, than other Parts of the Body, as appears from *Prop.* II.

Hence likewiſe appears the Reaſon, why the Fever, Vomiting, Pains, *&c.* preceding the Eruption of the Puſtules ſhould ceaſe or be much diminiſhed upon their Appearance; the *Moleculæ*, by the Force of the circulating Fluids, being driven into and fixt in the cutaneous Glands, and ſecretory Veſſels, whereby the capillary Arteries being freed from them, a more eaſy Paſſage is allowed to the circulating Fluids.

Hence alſo appears the Reaſon, why the Fever gradually increaſes with the Augmentation of the Puſtules, the contiguous Veſſels being compreſſed by their Diſtention, and the Obſtruction in the ſecretory Veſſels made more numerous; whence the Quantity of the perſpirable Matter being diminiſhed, and the Canals ſtreightned, the Veſſels will be more full, and the Pulſe more ſtrong and frequent.

Hence likewiſe it will follow, that the more numerous the Obſtructions are, and more pungent the contagious Matter, the more violent the Symptoms will be, and the Matter of the Puſtules when ſuppurated become an acrid and pungent gleety Diſcharge, or laudable *Pus*. As alſo why the Time of Suppuration ſhould vary in Proportion to the Virulency of the obſtructing Matter; and conſequently the Reaſon of the Difference between the diſtinct and confluent Small-Pox.

Hence alſo it will appear, that bleeding in the Beginning of the Diſeaſe, ought only to be adminiſtred where the *Impetus* of the circulating Fluids is ſo great, that notwithſtanding the Diminution of the Force of the Blood by it, the protruſive Force of the circulating Maſs will exceed the *Impetus* made on the obſtructing Matter by the Vibrations of the *Fibres*, and likewiſe why on its imprudent Uſe in the Beginning of the Diſeaſe, the Puſtules ſhould diſappear and be driven back into the ſanguineous Veſſels.

Hence alſo may be deduced the Reaſon of the Flux by the ſalival Glands, the Swelling of the Face, Hands and Feet, in the Height of the Diſeaſe, the Veſſels being at this Time turgid by the Suppreſſion of of the perſpirable Matter; and likewiſe the Neceſſity of ſuch Evacuations, as may reduce the Preſſure of the Fluids upon them to ſuch a Proportion, as the Tone of the Fibres may be able to reſiſt; and why where this is neglected, a *Peripneumonia*, Phrenſy, Delirium, *&c.* do frequently ſucceed.

Lastly, Hence may be deduced the Reaſon, why the Small-Pox ſhould rarely ſeize thoſe twice, who have had a competent Number of them. For the ultimate perſpirable Veſſels being diſtended much beyond their natural Tone, by the Bulk of the obſtructing *Moleculæ*, the ſecretory Veſſels muſt be left wider than before, and conſequently leſs ſubject to be obſtructed by Particles of this Size; agreeable to this is that Obſervation of Dr. *Sydenham* and others, that in thoſe Conſtitutions of the Air where the Small-Pox were very Epidemic, many (eſpecially ſuch as attended the Sick) who before had been affected with this Diſeaſe, were ſeized with a Fever in all Reſpects the ſame with that attending the Small-Pox, except only the Eruption of the Puſtules, and the Symptoms which neceſſarily attend on them.

THE

APPENDIX.

THE Preſſure of the Atmoſphere on the internal Surface of the Lungs, as computed in the foregoing Pages, ſo much exceeding that made by the ingenious Dr. *Kiel*, in the laſt Edition of his Book of animal Secretion, it may not be amiſs for the farther Illuſtration of it, to obſerve that the Weight computed by that learned Author is not really the whole Preſſure of the Atmoſphere, but the Force of the Lungs in Expiration, by which they exceed the Preſſure of the Air upon them; and how widely different theſe two Forces muſt be from each other, may thus eaſily be made to appear. For let the Tube A B be inſerted into the Veſſel C D E F of *App.Fig.1.* any given Dimenſion, and both the Tube and Veſſel filled with Water or any other Fluid, it is evident from the Writers in Hydroſtatics, that the Veſſel C D E F will on every Part of its internal Surface equal to the Baſis of the Tube, be preſſed by the Weight of a Column of the contained Fluid of the ſame Height with the Fluid, and whoſe Baſe is equal to that of the Tube, and conſequently every Inch ſquare on the internal Surface of the Lungs will be preſſed upon by a Column of Air, whoſe Height is equal to that of the Atmoſphere, and Baſe one Inch ſquare, which will amount to the aforeſaid

Sum. *Vide Pag.* 227 and 228. Now App.Fig.2. if we ſuppoſe the Tube X to be inſerted into the Neck of the Bladder Y, and the Air forced into the Bladder to be of an equal Denſity with that of the incumbent Atmoſphere, it is evident that the Air will not go out by the Tube without ſome additional Force, being in *Æquilibrio* with the Atmoſphere, and conſequently the Force by which it is expreſſed through the Tube, as it is through the *Aſpera Arteria* in Expiration, muſt be that by which it exceeds the Preſſure of the Atmoſphere, upon the Orifice of the Tube.

If any one think, that I have allowed too large a Quantity of Air to be taken into the Lungs in an ordinary Inſpiration, that is ſufficiently recompenſed by ſuppoſing, as I have done in the foregoing Calculation, the Diameter of the *Larynx* equal to 0.5 of an Inch and its Orifice 0.19, which is more than it can be, for the Diameter does not exceed 0.4, and conſequently its Orifice will be nearly 0.12. Now it being demonſtrated by the Writers in Hydroſtatics, that Weights forcing equal Quantities of the ſame Fluid out of the ſame Orifice, are to each other as the Squares of the Times in which the Fluid is forced out, and that in equal Times and Quantities of the ſame Fluid forced through unequal Orifices, the Weights are reciprocally as the Orifices; the Powers forcing an equal Quantity of Air through the Orifices 0.19 and 0.12 muſt be to each other in a reciprocal Proportion, compounded of the Squares of the Times and Orifices of the Tubes; which will be found ſufficient to anſwer any Objection of this Kind, by any who will give himſelf the Trouble to compute it (a).

(a) Future Obſervations and Experiments may, it is very poſſible, aſcertain the Degree of Force, which the contagious Particles exert upon the Lungs, to differ conſiderably from that Computation given above of it by the Author; yet as all Reaſoning on this Subject muſt be grounded on the ſame Plan and Principles with thoſe laid down in the foregoing Pages, the active Powers of the Particles will always be found capable of producing their terrible Effects, by operating in that Way and Manner, which, it has been, as I apprehend, the chief Purport of this Eſſay, more particularly to trace out and explain. I ſhall, therefore, only add, that the Author having thus fully ſhewn what are the Conſequences which muſt unavoidably enſue, when the peſtilential Virus is ſuppoſed univerſally to attack the Superficies of the Lungs, every inferior Degree of it may be taken into Conſideration without Difficulty; inſomuch that from hence I make not the leaſt Doubt, was the Method ſo happily at preſent made Uſe of in the Inoculation of the Small-Pox examined by this Standard; it would then appear, with how much Reaſon and Judgment the ſmalleſt Quantity of infected Matter, the ſlighteſt Wound, and that upon ſo remote a Membrane as the Skin of the Arm, in ſhort, every Circumſtance how minute ſoever, which by its Nature or Conſequences may poſſibly contribute to favour the deſigned Eruption, and abate the Violence of the contagious Fever, are made Choice of, and attended to with the moſt ſcrupulous Exactneſs, in the Proceſs of an Operation, expreſsly calculated for the ſafe Conveyance of a Malady ſo dreadful, and withal ſo neceſſary once in the Term of a human Life to be inflicted on, or undergone by almoſt every Individual of the Species.

FINIS

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